TECHNICAL REPORT 036

An Early History of the Research Branch, British Columbia Ministry of Forests and Range

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MEMORANDUM

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Re: Errata

Errata for Technical Report 036 - An Early History of the Research Branch, British Columbia Ministry of Forests and Range.

On the bottom of page iv the last paragraph says:

Cover photo–Research Division Staff Members, 1930. Back row (l-r): Ray Sansom, Fin McKinnon, Stig Schenström, Cliff Riley, and Braham Griffith. Sitting (l-r): Eric Garman, Arthur Pickford, George Barnes, and Percy Barr. (Source: Research Branch)

It should say:

Cover photo–Research Division Staff Members, 1930. Back row (l-r): Braham Griffith, Cliff Riley, Stig Schenström, Fin McKinnon, and Ray Sansom. Sitting (l-r): Percy Barr, George Barnes, Arthur Pickford, and Eric Garman. (Source: Research Branch)

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An Early History of the Research Branch, British Columbia Ministry of Forests and Range

RALPH L. SCHMIDT, FOREST ECOLOGY RESEARCH, JUNE 1954

An Early History of the Research Branch, British Columbia Ministry of Forests and Range

Ralph Schmidt and John Parminter

BRITISH COLUMBIA

Ministry of Forests and Range
Forest Science Program

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Cover photo–Research Division Staff Members, 1930. Back row (l-r): Ray Sansom, Fin McKinnon, Stig Schenström, Cliff Riley, and Braham Griffith. Sitting (l-r): Eric Garman, Arthur Pickford, George Barnes, and Percy Barr. (Source: Research Branch)

Half title photo–Source: Ralph Schmidt

2007-01376/

I retired from the Research Branch of the B.C. Forest Service in May 1982. Unfortunately, I did not acquire an active interest in the early history of this organization until 9 years later. During that interval, several old-timers who had worked in the Research Division passed away. Their stories went with them, reducing the opportunities for us to unravel the past.

The start of my active role with forest history began in early 1991. Bill Young, then president of the Forest History Association of British Columbia, asked me to prepare a presentation on the history of the Cowichan Lake Research Station for their annual meeting, which was to be held there in June. I felt obliged, because Bill and I had been friends since 1945, first as classmates at the University of British Columbia, then as forest survey crewmates for two summers. After joining the B.C. Forest Service in 1949, we boarded together in Victoria, and we had also curled together for several seasons. Years later, as chief forester, Bill had been very supportive of the Research Division when I was the director.

Somehow I would have to work up sufficient interest and enthusiasm in this project to do an acceptable job, but I didn't imagine that the task would be too onerous—perhaps it would require only a couple of weeks to complete.

As it turned out, whenever I discovered some new facet of a past event, more questions would arise, and my research would take off in yet another direction. Fortunately, at an early stage in this project, I found old newspaper clippings and photos while I was snooping in obscure places at the Cowichan Lake Research Station. By the time the project was completed, after 2 months of concentrated effort, I was hooked on forest history.

My presentation at the annual meeting at Cowichan Lake was well received. A decision was made that day to publish my paper, with joint financial support from the Forest History Association of British Columbia and the Research Branch. At the end of the meeting, Ted Baker, director of the Research Branch, asked if I was interested in writing a report on the history of forest research in the B.C. Forest Service.

My reply was enthusiastic and positive, so a few weeks later, I launched the project that has commanded my attention for so long and given me so much enjoyment (and frustration). My greatest delight has been in establishing contact with many of the old-timers and their families, and in recording information that exists nowhere else.

The frustrations have been a prolonged illness that made it difficult for me to work for long periods of time, and trying to figure out what had happened after I retired in 1982. Since that time, the Research Branch has become a much more complex organization. This history, however, covers only the period up to 1970. The timeline in Appendix 2 was assembled from the annual reports of the B.C. Forest Service by John Parminter, a current employee of the Research Branch, and complements the historical narrative and biographies that I produced.

The research methods that I used for the early part of the history are discussed in Chapter 1. For the later history, there have been two major sources of information. The first was the standard archival materials in the Ministry of Forests and Range library in Victoria. The B.C. Forest Service Annual Reports and the Research Branch Forest Research Reviews provide a lot of basic information, but they do not exist for all of the years covered in this history.

The second, and more important, source has been personal contact. I conducted 23 personal interviews and communicated with many people by phone and mail.

I used a combination of note-taking and tape-recording during the interviews. In addition, I requested and received quite a bit of written material from interviewees and their families. These have been the sources for text in this history that is set aside as quotes. I do not want to pretend that these are literal quotes of exactly what was said: I have made an honest effort to capture the content, and in most cases, have given people an opportunity to review and edit what they have been quoted as saying.

The research facility at Cowichan Lake, on Vancouver Island, was originally named the Cowichan Lake Forest Experiment Station. It was renamed the Cowichan Lake Research Station in 1979. Throughout this history, it is referred to by its current name. Similarly, the Aleza Lake Experiment Station is referred to by that name rather than its original one, the Aleza Lake Forest Experiment Station.

The doctoral title (Dr.) is not used in this history, unless it is part of a direct quotation or refers to a doctor of medicine.

As was done for the histories of the Cowichan Lake Research Station in 1992 and the Aleza Lake Experiment Station in 1993, the Forest History Association of British Columbia and the Research Branch have shared the costs of publication of this document. It is hoped that additional collaborative ventures of this nature will be carried out in the future.

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CHAPTER 1 THE QUEST FOR PIONEERS

When I was preparing an earlier report on the Cowichan Lake Research Station, the stories and photos that came from some of the former researchers—the old-timers—were the most valuable sources of information. To cover the history of the entire Research Program, I decided to take a similar approach.

My starting point was a 1930 photo showing the staff members of the Research Division dressed in their Sunday best, in a photographer's studio (cover photo). I had known three of the men in that photo, but I knew nothing about the other six. It would be necessary to know a great deal about each one to unravel the past, so I decided to start the project by preparing a biographical sketch of each person in the photo. The assumption was that doing sketches would produce a lot of the information I needed to write the history. Indeed it did: as I learned more, additional individuals came to light, and the result was 17 biographical sketches for the early period, before 1939.

I selected Percy Barr as my first subject, simply because he was in charge of the Research Division when it originated. A search of the Ministry of Forests and Range library yielded several reports by Barr, including a summary of forest research in British Columbia from 1921 to 1927. Additional information came from the provincial archives and from *Root and Branch*, a B.C. Forest Branch (now the B.C. Forest Service) newsletter produced in the mid-1920s.

Bob St. Clair and his horse Nellie, Bull River, B.C., 1913. (Source: Dick St. Clair)

To obtain more personal information I contacted Phil Haddock, then professor emeritus at the University of British Columbia. Haddock graduated from the School of Forestry, University of California at Berkeley, and Barr had been one of his professors. Haddock provided some first-hand information, and kindly loaned me a copy of *Forestry Education at the University of California: The First Fifty Years* by Paul Casamajor (1965). It contained a wealth of information on Barr's career. I also obtained first-hand information from several old-timers.

The late Braham Griffith, professor emeritus, Faculty of Forestry, University of British Columbia, had been a member of the Research Division from 1927 to 1936. I sent a copy of the 1930 staff photo to him, along with a list of questions about the individuals pictured. He responded with a nine-page letter answering the questions, and ending with the following statement.

A person not in the photo and not mentioned by you is J.D. Curtis. Curtis graduated from UBC in 1930 and joined the B.C. Forest Service. I worked with him in the summer of 1930. That winter Curtis went east for graduate work, then went teaching in Amherst College in Massachusetts; then to the Forest School in Maine from where he joined the U.S. Forest Service, Research Division, and eventually retired from the North West Experimental Station at Idaho City. He returned after retirement to his ancestral home in Comox, B.C., where he died a few years ago.

The thought occurred to me that perhaps Jim Curtis' widow might still be living in Comox, and I might be able to get some information and photographs. I checked the Comox phone book and found a listing for J.D. Curtis. A lady answered my call, and she indicated that her husband had indeed worked for the Research Division more than 60 years ago. I assumed that I was talking to a widow, so I asked some questions about Mr. Curtis. Mrs. Curtis answered a couple of questions, and then she said, "I could go on giving you my best answers, but why don't you talk to Jim?" He was apparently sitting in the next room, very much alive, reading the newspaper. He came to the phone, and after a brief chat it was arranged that I would drive to Comox and meet him on the following weekend. Braham Griffith had been misinformed of Curtis' death. It was the *only* occasion on which I got misleading information from him.

In the same letter, Griffith had also written that Jim Robertson was alive and that he had retired to California many years ago, after teaching for 16 years at the College of Forestry, University of Washington. I phoned Stan Gessel, professor emeritus, University of Washington, who gave me Robertson's address and sent a copy of *The Long Road Travelled* by Henry Schmitz, published in 1973, which contained a synopsis of Robertson's career.

Up to that time, 93-year-old Eric Garman was the oldest survivor of the Research Division whom I had encountered. Jim Robertson now took over first place, at 95 years of age. I felt sure that this age record was the ultimate, since I had laboriously prepared a complete list of all Research Division survivors. But the age record would be broken again.

Again it was Griffith who provided the key information. I had seen brief reference to a forester named Joe Falconer, who had worked as a researcher at Aleza Lake in 1926. Griffith remembered Falconer: "I seem to recall that in later years, Joe was in the investment business in Victoria, and may well be alive, although he is a lot older than me." (Griffith had recently celebrated his 90th birthday.)

When I returned to Victoria, I checked the phone book and found Joseph

G. Falconer listed at a Shelbourne Street address, not very far from the former location of the research nursery established by the Research Division in 1927. I phoned and a lady answered. She confirmed that it was the residence of Joe Falconer who had worked for the Research Division 66 years ago, but I wasn't able to see him, because the 98-year-old had taken a bad fall, broken his arm, and hurt his back. He was convalescing at home under the care of his wife, who was a nurse. About a month later I was finally able to interview Falconer, who was by then up and about. He provided a copy of his memoirs, which he had prepared when he (finally) retired at the age of 93. (I had been retired 5 years longer than he had!)

My visit with Jim Curtis in August of 1991 was the beginning of a good friendship. Whenever I would discover additional information about his associates of 60 years ago, I would contact him and probe his memory. Jim had the ability to recall details of events that he hadn't thought about for decades. That faculty was of great use when I was searching for information on Stig Schenström.

Although Schenström worked for the Research Division for less than 3 years, he had left his mark, establishing the first experimental thinning plots in coastal British Columbia. These plots, at the Cowichan Lake Research Station, have been given scheduled treatments and re-measurements over the decades, and are a delight to behold. Schenström went to South America after his British Columbia research job disappeared during the Depression. I had managed to find only a smattering of information about him, through Ingemar Karlsson, who had written on my behalf to the Swedish University of Agricultural Sciences at Umeå, Sweden.

One day, during a conversation with Curtis, I told him how frustrated I had become in my search for information on Schenström. After a lengthy pause, Curtis suddenly lit up and said:

Something just occurred to me that hadn't crossed my mind for many years. Schenström and I were good friends during the few years that he was here. I was his assistant in 1929 and 1930 in establishing the thinning plots and other experiments at Cowichan Lake. We shared a tent down by the lakeshore, and also went out together socially. And here's the event that just came to mind. Schenström's fiancée arrived from Sweden, and they were married in Victoria. I was invited to the wedding. The reception was held at the home of Schenström's cousin, who was a physiotherapist with an office in the Pemberton Building.

On returning home, I checked the Victoria phone book for 1930. Only one physiotherapist was listed, Gotfrid Björnsfelt of 939 Pemberton Road. I then searched the 1992 phone book and found one listing with that surname—I. Björnsfelt—who turned out to be Gotfrid's daughter. She provided me with the names and addresses of two relatives in Sweden. One of these was a genealogist who sent me more than 30 photos, as well as many pages of information on Schenström. All from that clue from Jim Curtis!

Considerable information about B.C. Forest Branch old-timers came from a newsletter series printed during the early 1920s under the banner *Root and Branch*. Each issue contained a variety of news pertaining to staff movements and important events, as well as articles of various lengths that addressed important forestry topics of the day.

The October 1923 issue included a four-page report by Bob St. Clair, who had just been promoted to assistant chief forester. The report assessed the

status of forest research in the province, and strongly recommended the establishment of a research division with headquarters in Victoria, as well as a forest experimental station in each major forest region of the province. As a first step, St. Clair recommended that two stations be established, one in the spruce–balsam forests of the Central Interior, and one in coastal Douglas-fir. Within a year the first experimental station became a reality at Aleza Lake—sufficient impetus for a biographical sketch of St. Clair.

I gradually accumulated snippets of information about St. Clair from B.C. Forest Service retirees who had known him, but who had not been associated with him in their work. I also obtained a copy of his obituary from the *Forestry Chronicle*. But on studying the whole package of information, there appeared to be several conflicting statements.

I decided to phone every St. Clair listed in the Victoria phone book. Fortunately, by just the second call, I was talking to Bob's son, Dick, who had recently moved to Victoria on his retirement from a career in Ottawa. Dick sorted out a number of points. He had also saved some of his father's photographs, as well as a very informative resumé used by his father when he had applied for a forestry position with the Dominion Forestry Branch in 1915.

Family members also played a key role in researching Cliff Riley. In 1929, Riley had been hired to supervise all activities during the establishment of the Cowichan Lake Research Station. He stayed with the Research Division only 2 years, leaving to accept a very good job in Ottawa. During the last 16 years of his career he was officer in charge of the Forest Pathology Laboratory in Saskatoon, and he remained in that city after his retirement in 1964. Both he and his wife died a few years ago.

To prepare a biographical sketch of Riley, I asked one of my cousins in Saskatoon to help me track down Riley's children. Through a rather complex process, my cousin was able to identify old friends of the Rileys, who in turn supplied names and addresses of a son and daughter living in Ontario. They were delighted that someone was writing a sketch of their father, and I soon received a package of information. Included was a document of considerable historic importance that was sent to Riley in 1931 by Percy Barr, who was then in charge of the Research Division. This typed document is the first brochure describing the Cowichan Lake Research Station. The report, illustrated by photographic prints, now resides at that facility.

George Barnes and Braham Griffith established a continuing friendship when they worked together at the Aleza Lake Experiment Station for several years in the late 1920s. They continued to correspond until Barnes' death in 1974. After that, Griffith kept in contact with Barnes' widow, May. Through him, I was able to get in touch with her, and she forwarded valuable information and photographs.

Cedric Walker was also a significant source regarding the early days in research. I contacted Walker, at the suggestion of Gerry Andrews, who told me that Walker had worked on forest surveys for more than 10 years. It turned out that Walker's very first field season, 1925, was spent at the recently established Aleza Lake Experiment Station. Walker provided many stories of the events of that summer, as well as some very useful photographs.

When starting an interview with someone, I never quite knew what to expect. One of the biggest surprises came during a meeting with Beatrice McKinnon, Findlay McKinnon's widow. As our session drew to a close, she brought out a first edition of *Woodsmen of the West*, written by Martin A. Grainger in 1908. According to a paragraph written by the author on one of

the front pages, this particular copy had been given to the Minister of Lands, W.R. Ross, at Christmas in 1910. With the passage of time, the book became the property of H.R. MacMillan.

MacMillan recognized the historical value of the book, and in 1952 he gave it to Chief Forester Chauncey Donald (Dick) Orchard. He attached a lengthy letter, in which he described Grainger's role as a principal founder of the B.C. Forest Branch. In that letter, MacMillan also urged that the book remain in the chief forester's office. Orchard agreed, and after his retirement, he gave the book to the incoming chief forester, Fin McKinnon. He also included a letter suggesting that the book continue to remain in the chief forester's office. On his retirement, McKinnon moved the book to his personal library at home.

I accepted the book from Beatrice McKinnon, and on May 3, 1994, presented it to Chief Forester John Cuthbert in a formal ceremony conducted by the Forest History Association of British Columbia. This book, and its attendant messages, is now on display in a custom-built case located in the Executive offices of the B.C. Ministry of Forests and Range.

CHAPTER 2 THE FOUNDERS (1912–1939)

The Rise and Near Extinction of the Research Division

The original B.C. Forest Branch (known after April 5, 1945 as the B.C. Forest Service) traces its roots to the Royal Commission on Timber and Forestry, which worked from June 1909 to November 1910. The *Forest Act*, tabled in the provincial Legislature in January 1912, was one consequence of that commission. And the branch was created as a result of that act.

Upper left *Eric Garman and Fin McKinnon, 1926. (Source: Eric Garman)* **Upper right** *Percy Barr, forester in charge of the Research Division from its inception in 1927 until 1932. The photograph was taken in 1955. (Source: Helen Barr)* **Centre left** *Shelbourne Street nursery, Saanich. This experimental nursery was established in 1927. Arthur Pickford was the researcher in charge, until he took over the Green Timbers nursery during its establishment phase in 1930. (Source: Eric Garman)* **Centre right** *The first University of British Columbia Forestry class to visit Cowichan Lake Research Station, April 27, 1931. Standing (l-r): Charlie Schultz, Charlie Dunham, Malcolm Knapp (instructor), H.R. Christie (instructor), Dick Nixon, and Tom Groves. Sitting (l-r): Bill Latta, Lorne Swannell, and Bill Hall. The office in the background now serves as a visitors' reception area at the Surrey nursery. (Source: Jim Curtis)* **Lower left** *Braham Griffith gallivanting near Cowichan Lake in his brand new 1930 Ford Model A roadster. (Source: Jim Curtis)* **Lower right** *Eric Garman at the age of 93 doing his sitting exercises at a seniors' centre. Eric was the first person to spend his entire career in the Research Program of the B.C. Forest Service. (Source: Times Colonist, Victoria)*

During the first years, several individuals played key roles in shaping the B.C. Forest Branch. Two of those were H.R. MacMillan and Martin A. Grainger.

Grainger was the first on the scene, and may have been the first employee of the B.C. Forest Branch. He had led a very colourful life before being hired in July 1909 as secretary for the three-man Royal Commission on Timber and Forestry. In 1896 he graduated in Mathematics from Cambridge University, and a year later he joined the Klondike gold rush. He left to fight in the Boer War in 1899, and was back placer-mining near Cassiar by 1901. Grainger returned to England in 1902, where he operated a ju-jitsu school. He came back to British Columbia by 1905, where he worked in the logging industry, then went back again to England in 1908. He wrote a book there, called *Woodsmen of the West*, to pay for his transportation back to Canada. A year later, he and his new wife had settled in Esquimalt and he was soon hired as secretary to the Royal Commission. In 1915, Grainger succeeded MacMillan as chief forester of British Columbia.

Grainger had no formal training in forestry. How then was it possible for him to become chief forester of the B.C. Forest Branch? The answer lies mostly in the conduct of the Royal Commission, which first arranged hearings in 11 cities in British Columbia and then travelled to eastern Canada and the United States. It was during these hearings in British Columbia, and the meetings with high-ranking foresters outside of the province, that Grainger absorbed most of his forestry education. Evidently he was a very astute observer, because by just a few years later, as chief forester, he was highly regarded by the B.C. Forest Branch staff for his competence and leadership.

The members of the commission were the Hon. Frederick J. Fulton, Chief Commissioner of Lands (chairman); Arthur S. Goodeve, the Conservative Member of Parliament for Rossland; and Alfred C. Flumerfelt, a businessman from Victoria. While their main concern was to address land tenure, fire protection, and forest conservation problems, the need for research was not entirely overlooked. A recommendation was made to set aside 285 ha of land for experimental and demonstration purposes.

When the commission's report was completed, Grainger continued to work on forestry matters for the Minister of Lands, the Hon. William R. Ross. He was first charged with reviewing all of the existing legislation relating to forestry. When he had completed that job, he recommended the preparation of the *Forest Act*. At that stage, an outstanding American forester, Overton Price, was hired to help develop the organizational structure of the B.C. Forest Branch.

H.R. MacMillan appeared on the scene in 1912. He was a 1906 graduate (BSc Honours in Biology) from the Ontario Agricultural College at the University of Guelph. The following year, he got his first taste of life in British Columbia, as a timber cruiser in a field party that worked in many areas in the Vancouver Forest District.

In 1908, MacMillan earned his MF degree at Yale University. After an extended bout with tuberculosis, he became an assistant director of forestry in charge of planning and statistics for the Forestry Branch of the Canadian Department of the Interior in 1911.

In selecting a candidate for the position of chief forester in British Columbia, Ross, the Minister of Lands, sought the advice of Henry S. Graves, the newly appointed chief forester of the U.S. Forest Service. As dean of the Yale School of Forestry, Graves had been very impressed by an outstanding

post-graduate student from Ontario named Harvey MacMillan. Acting on this advice, Ross offered MacMillan the chief forester position and he accepted.

MacMillan and Grainger were co-workers, with Grainger becoming assistant chief forester in charge of the records office. A year later, he was acting chief forester while MacMillan was on a world tour, and in January 1915, Grainger became chief forester after MacMillan resigned.

In the 1952 letter that MacMillan wrote when he passed on the copy of *Woodsmen of the West* to Chief Forester C.D. Orchard (mentioned in the Foreword), MacMillan explained the importance of Grainger's role in keeping the commission on track and in writing the *Forest Act*: "There probably would have been no *Forest Act* in 1911 if it had not been for the flaming zeal of Grainger."

The first visible recognition that forest research was indeed considered essential in British Columbia occurred under Chief Forester MacMillan's leadership. In 1913, at MacMillan's request, J.M. Swaine of the Dominion Forestry Branch was sent to British Columbia to evaluate forest entomological problems. During one field season, Swaine completed a preliminary investigation of the insects affecting ponderosa pine, Douglas-fir, Sitka spruce, lodgepole pine, and western white pine. His report also recommended insect control measures.

A similar arrangement was negotiated by MacMillan in 1914, which resulted in C.D. Howe of the Faculty of Forestry, University of Toronto, coming to British Columbia to investigate natural regeneration of Douglas-fir cutovers. His report stressed the difficulty of obtaining natural regeneration when a cutover was subjected to more than one slashburn.

At an early stage, the B.C. Forest Branch recognized the need for growth estimates in developing working plans that would recognize sustained yield principles. In 1915, a message went out from MacMillan to the district foresters:

> *No thorough study has yet been made of the rate of growth of our timber on difficult sites. I propose paying some attention to this work during the coming year, in order that some opinion may be formed as to the length of time necessary to grow a second crop in logged and burned districts. This information may be gained by existing staff at slight expense. (Source:* Annual Report, *Forest Branch, 1915)*

The response to this directive was immediate, but because of manpower shortages during the war, it was not a sustained effort. Significant work was not done on the establishment of growth and yield plots until 1921.

It was also in 1921 that the B.C. Forest Branch recognized the need for a full-time researcher headquartered in Victoria. In that year, J.L. Alexander, a new graduate from the University of Toronto, was hired to do research.

Although he eventually specialized in forest mensuration, Alexander was a generalist during his early years with the B.C. Forest Branch. His activities extended to many parts of the province, on research projects dealing with growth and yield, production of volume tables, natural regeneration, logging waste, slash disposal, and fire protection.

In 1923, the research staff doubled with the addition of Arthur Pickford. In that year, he assisted Alexander on regeneration studies of coastal Douglas-fir cutovers. The next year he was assigned his own research projects, including a study of the effectiveness of natural seeding at varying distances from the

seed source. Two years later, he was put in charge of a small research nursery established on Shelbourne Street in Saanich (see photo, page 6).

The year 1923 was also marked by strong research recommendations from Bob St. Clair, the newly appointed assistant chief forester. He wrote a four-page report that addressed the need for a strong forest research program headquartered in Victoria. He also recommended the establishment of a forest experimental station in each of the principal forest regions. St. Clair was an American forester who had joined the B.C. Forest Branch in 1918, after completing an MF degree. He had also worked for the U.S. Forest Service, and was familiar with American forest experimental stations. The response to his recommendations was the establishment of the Aleza Lake Experiment Station in 1924 and the Cowichan Lake Research Station in 1929.

A third researcher, Percy Barr, was hired in 1924, immediately after he graduated from the University of British Columbia in Forest Engineering. Barr was hired to address regeneration problems in the interior of the province. His first job was to select an area of commercial spruce–balsam forest in the Central Interior as a site for an experimental station. The following year he was given the responsibility of developing the Aleza Lake Experiment Station.

Two additional researchers came on staff in 1926. George Barnes was hired as a forest mensurationist to fill the need for volume and yield tables in the Central Interior. Braham Griffith first assisted George Barnes, and later undertook his own research projects at the Aleza Lake Experiment Station.

In 1926, at a meeting of the Canadian Society of Forest Engineers (later the Canadian Institute of Forestry) held in Vancouver, Alexander presented a paper that reviewed the development of forest research in the province. He noted that, "In 1924 the field of study was divided between the Northern Interior and the Coast, each in charge of a permanent officer independently under the management office at Victoria." Alexander was in charge of the Coast section, and Barr of the Northern Interior. The reasoning was that logging in coastal forest types accounted for more than 80% of the annual provincial harvest, and regeneration surveys of cutovers had clearly identified serious restocking problems. It was decided that a concentration of research in a representative coastal location would help solve the problem. As far as the Northern Interior was concerned, Alexander explained that, "The necessity of sound knowledge of practical silvicultural methods in the spruce–balsam types is emphasized by the rapid development of the lumber industry in the Upper Fraser and the prospect of the establishment of pulp mills in the near future." The latter statement also reflects the high level of optimism that pervaded the B.C. Forest Branch before the Depression.

It is of more than passing interest that Alexander did not confine his 1926 presentation to his own research responsibilities: he also described the research program for which Barr was responsible. In pursuing this course, Alexander more or less assumed a position as spokesman for research for the entire province—and there may have been good reason for doing so. The establishment of a Research Division was imminent, and the head position would unquestionably go to either Alexander or Barr. Alexander had the advantage of having worked in the Research Section of the B.C. Forest Branch since 1921, whereas Barr had started in 1924. However, in terms of training and ambition, Barr had the edge. He had completed his MF degree at Yale University in 1925, and had commenced studies for a PhD.

When Barr got the promotion, Alexander left the Research Division to

teach as an assistant professor in the fields of Silvics and Silviculture at the University of Washington. Disappointment at being passed over for promotion may have contributed to this decision. Years later, he would return to the Research Division under different circumstances.

The birth of the Research Division in 1927 was attended by a high degree of support from senior B.C. Forest Branch staff. That was clearly illustrated by the recognition that research must play a vital role to facilitate forest management. Support also took the shape of sustained increases in staffing and research budgets: by 1927 there were seven researchers on staff, and research expenditures reached $34 000. Much of the credit for the executive support must go to Barr, who had established excellent rapport with his seniors.

By 1927, considerable progress had been achieved at the Aleza Lake Experiment Station. A plan had been developed to convert the area into a managed forest, primarily to demonstrate sustained-yield forest management. The allowable annual cut of 1 million board feet had been taken out during the winter of 1926–1927. A ranger, Ray Sansom, was hired as the resident station foreman. Several buildings had been constructed to provide accommodation and research facilities. A great deal of credit for the rapid progress made at the Aleza Lake Experiment Station also went to Barr, who had directly supervised most of the activities there.

The years from 1927 to 1930 were indeed the "glory days" of the Research Division. The dark clouds of the Depression were not yet apparent, and an air of optimism prevailed among the staff of the new division. The number of personnel continued to increase during this period. Jim Robertson was hired in 1928, and three more researchers in 1929: Fin McKinnon would ultimately become chief forester and deputy minister, Cliff Riley was specifically hired to supervise the establishment of the Cowichan Lake Research Station, and Stig Schenström, a Swedish forester, established the first experimental thinning plots in coastal British Columbia.

The *Forest Branch Annual Report* of 1930 reflects the tone of the day:

> *More satisfactory progress has been made in research and reforestation during 1930 than in any previous year. Difficulties and delays encountered in the selection and training of research officers have been largely overcome and the Forest Service now has a well-organized research staff which is devoting attention to the problems underlying the application of scientific forestry to the timber lands of the Province.*

Several staff changes occurred in 1930. Pickford was selected to take charge of the first production nursery establishment at Green Timbers, in Surrey. Robertson accepted a job with the Queensland Forest Service in Australia (but returned 2 years later). Jim Curtis, who had been Schenström's summer assistant the previous year, was hired as a full-time researcher.

This was the last year of growth until after the Depression (see Figure 1). In 1931, Riley left to accept a position as a forest pathologist in Ottawa. That same year, research funds fell from $56 000 to $30 000, and in 1932 there was a further cutback, to $20 000. These circumstances convinced Barr to look for employment elsewhere, and in late 1932, he accepted a teaching job at the School of Forestry, University of California at Berkeley.

Barr had been in charge of the Research Division since 1927. When he left, Ernest C. Manning, assistant chief forester, became acting head of the division, in addition to his normal duties. In 1936 Manning became chief forester, and Dick Orchard became assistant chief forester. The following year, Fin

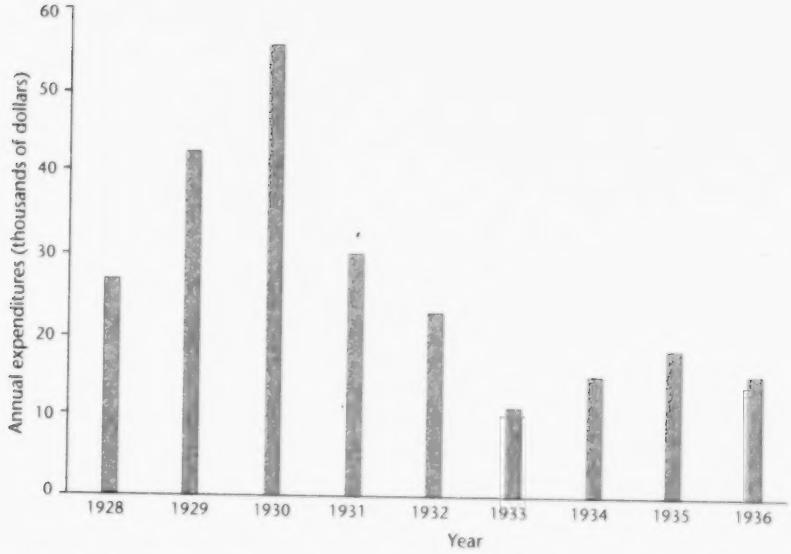

FIGURE 1 *Impact of the Depression on Research Division expenditures, 1928–1936. Figures include capital costs and salaries. (Source: Research Branch)*

McKinnon was named second in charge of the Research Division.

Staff reductions continued until 1937. Schenström was laid off in 1932 and found employment in South America. Curtis was laid off in 1933 and obtained a teaching job in Forestry at Massachusetts State College (now the University of Massachusetts). Three more researchers departed in 1936: Griffith accepted a teaching fellowship at the University of Washington; Barnes left to teach at the University of Utah; and Robertson, who had returned from Australia, resigned to teach at Colorado State University (see Figure 2).

The job situation in the Research Division was probably no worse than elsewhere in forestry. During most of the 1930s there was only limited opportunity for continuous employment in forestry, as the following examples show.

- Dick Spilsbury graduated with a degree in Agriculture in 1929 after working for three summers on forest survey field parties. On graduation he was able to get a soil survey job under joint federal/provincial funding. That work spanned a 9-year period, but funding was tenuous, and frequently it ran out completely, leaving no money for the work to continue for the winter months. Spilsbury's first opportunity for continuous employment came 10 years after graduation, as a result of the devastating Campbell River–Courtenay forest fire of 1938. Immediately after the fire, the B.C. Forest Branch began to plan a major reforestation program for the area, and Spilsbury was hired to conduct a soil survey so that potential agricultural lands would be excluded from the planting project. He conducted similar work on other reforestation projects until 1944, when he began his research career.
- Times were so tough during the 1930s that graduate foresters were happy to work on any short-term project. One of the earliest operational reforestation projects in British Columbia took place in March 1932 on West

Thurlow Island. Slightly more than 20% of the planting crew were Forestry graduates—a record that probably still holds today. Several of those graduates eventually became prominent foresters: John Liersch (head of the Department of Forestry at the University of British Columbia, 1945–1947), Lorne Swannell (chief forester of the B.C. Forest Service, 1965–1972), and Charlie Schultz and Marc Gormely (consultants).

- Joe Falconer found himself without a job in 1932, having just earned a PhD in Forestry at Yale University. During the previous years he had worked for the B.C. Forest Branch in both the Research and Forest Surveys divisions. He had also worked for the Ontario Department of Lands and Forests and the Dominion Forest Service. Despite the contacts he made during these years, and despite his advanced training, he could not get a forestry job in Canada. He finally got a job teaching school in a small town in Alberta. As time went by, Falconer had an exceedingly varied career that included many jobs and business activities, but not in forestry.

The effects of the Depression on the Research Division were overwhelmingly negative, but there were a few exceptions. One of those was the impact of the relief programs for the unemployed. Relief crews were stationed for several summers at both experimental stations, and the long-term impact of their work is most evident at the Cowichan Lake Research Station. The construction of a road and a camp provided facilities for reforestation crews. In turn, the financial and other support provided by the Reforestation Division effectively kept the station alive for three decades. Without that support, the station may well have been abandoned, since there were no funds available for it from within the Research Division.

Research Division staff levels reached a low point in 1936, when only two researchers remained, Eric Garman and Fin McKinnon. But it was in that same year that the newly appointed chief forester, Ernest Manning, decided to rebuild the Research Division. He was very aware of the need for research on forest management problems. In 1937 he approached Gerry Andrews, a University of Toronto graduate who worked in the Forest Surveys Division, and asked him to recommend someone for research. Andrews recommended Angus MacBean, who had been an outstanding student at the University of Toronto, as well as a classmate of Andrews. After graduating, MacBean worked in the Research Division of the Ontario Department of Lands and Forests until the Depression caused it to close. Manning offered MacBean a research job, and he accepted immediately.

Manning also offered a research position to George Allen in 1937. Allen had established a good reputation as a researcher. He had worked for the Research Division during the summers of 1934 and 1935, while he was instructing in Forestry and doing post-graduate studies at the University of British Columbia. He earned his MASc there in 1935. He had also worked for the Research Division in the summer of 1936. Allen was very interested in full-time employment, so he accepted Manning's offer.

As the 1930s drew to a close, a decision was made to combine the Research and Forest Surveys divisions into one unit called the Economics Division. The reason for this reorganization was presented in the *Forest Branch Annual Report* of 1938: "It is anticipated that an amalgamation [of the Research and Surveys divisions] will improve supervision and eliminate existing duplication of effort." A much more detailed explanation was presented in the *Forest*

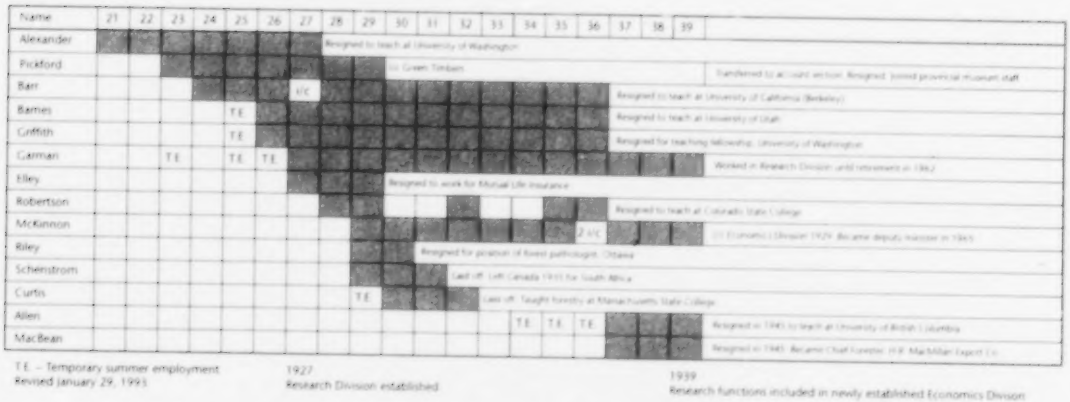

FIGURE 2 *Record of employment of B.C. Forest Branch researchers, 1921–1939. The Depression had a debilitating effect on the Research Division, as many good researchers left to take up careers elsewhere. (Source: Research Branch)*

Branch Newsletter of November 1939, but that lengthy article is both obscure and unconvincing.

In simple terms, the main reason for establishing the Economics Division was to cut administrative costs. Many different functions were combined under one administrator. These functions were represented by small sections responsible for Reforestation, Air Surveys, and Parks and Recreation, in addition to Research and Forest Surveys. A small section, dealing with Forest Management Licences, was added in 1944.

The creation of the catch-all Economics Division ended an era of great change for the Research Division, which had started out in 1927 with hope and optimism and had become the largest and most active forest research organization in Canada by 1930.

The accomplishments of the Research Division during this period were considerable, particularly given the fact that there were never more than five researchers in the division between 1927 and 1932. The most important accomplishments included:

- identifying critical regeneration problems in both coastal and interior forests,
- developing nursery cultural techniques for raising bareroot planting stock,
- producing a variety of volume and yield tables, and
- establishing two experimental stations that have functioned for many years and provided facilities for staff and crews from many forestry sectors.

Perhaps the most serious loss during the 1930s was the departure of Barr, who led the Research Division for 5 years. He was a leader of considerable vision and talent who had succeeded in convincing senior staff of the need for research. With his departure, this senior level of support disappeared, and it would not be regained for several decades.

CHAPTER 3 THE REJUVENATORS (1940–1971)

Dedication and Frustration

The Economics Division existed for only 11 years, from 1939 to the end of 1950, and began to disintegrate by the mid-1940s. As individual sections gained in status (human resources and budget) they became divisions in their own right and were removed from the Economics Division. The Reforestation Section under Harold McWilliams was the first to separate in 1946. Two years later, the Parks and Recreation Division became an entity under the direction of Cy Oldham.

On April 5, 1945 the Department of Lands was reorganized to become the Department of Lands and Forests, with individual deputy ministers for both Lands and Forests. The B.C. Forest Branch then became the B.C. Forest Service and reported to its own deputy minister.

In the spring of 1948, at the first annual meeting of the Natural Resources Conference, Fin McKinnon, who was in charge of the Economics Division, gave a speech in which he identified the following components of the division, and the men who were in charge:

Growth and yield – J.L. Alexander
Soils research – R.H. Spilsbury
Forest surveys – M. Pogue
Forest inventory – D. Macdougall
Silviculture research – E.H. Garman
Provincial parks – C. Lyons
Management licences (1 year only) – R.C. Telford

Left *Ralph Schmidt in front of 558 Michigan Street, Victoria, 1949. This house served as headquarters for the Research Section of the Economics Division during most of the 1940s. (Source: Ralph Schmidt)*
Right *Alan Fraser in front of 558 Michigan Street, Victoria, 1949. (Source: A.R. Fraser)*

During the 1940s, because most of the Economics Division was housed in another building, the Research Section staff felt somewhat isolated, being located in an old house at 558 Michigan Street. They shared it with the small Air Surveys Section.

The main factor behind the demise of the Economics Division was the implementation of the federal *Canada Forestry Act* of 1949. It enabled the federal government to enter into agreements with individual provinces to accomplish stated provincial objectives relating to forestry programs. Such an agreement enabled the B.C. Forest Service to conduct a forest inventory of the entire province in an intensive 5-year program. Major expansion of the Forest Surveys Section was required, so the Surveys and Inventory Division came into being in 1951. All that was left of the Economics Division was a small research component of 13 professionals.

However, an executive decision was made to reconstitute the Research Division, perhaps because the "Economics Division" title had become redundant. Spilsbury became the administrator of this newly created division, where he soon discovered that plans did not exist for defining the role of the Research Division in relation to the rest of the B.C. Forest Service. Nor was there a hope of significant budgetary or staff increases. It was apparent to him that many years would pass before the Research Division would have a role in forest management, because the division was not destined to share the experience of goal-setting by the chief forester. That was now enjoyed by the Surveys and Inventory Division.

For a brief time, the massive increase in financial support for the Surveys and Inventory Division offered some hope that the Research Division might also see similar growth. After all, the report of Chief Justice Sloan's Royal Commission in 1945 made strong recommendations that research be significantly expanded:

> *I can not stress too strongly the necessity of a vigorous programme of research to be undertaken by the Forest Service, either alone or in conjunction with the Dominion Government and industry. There is much to be learned concerning regeneration, and the logging methods best suited to ensure it, rates of growth or yield on different sites, the effects of intensive silviculture methods, fire protection—including slash-burning—utilization, and a host of other related and unrelated subjects.*

This recommendation was, however, ignored. A decade later, in his second report, Sloan chided the B.C. Forest Service for not giving sufficient attention to expansion or research, and he again took the opportunity to make recommendations:

> *All I can do is to recommend again to the Government as I did ten years ago that, in the public interest, the Research Division should be adequately housed, equipped, and financed to perform its duty efficiently so that the next Commission ten years hence, and the Forest Service in the interim, could be better served by vitally needed information on matters germane to the proper management of our forest resource.*

During the next decade the Research Division did experience some positive changes, but overall funding still remained a problem. One serious consequence was the abandonment of the Aleza Lake Experiment Station, in 1963.

There was some expansion in research staff between 1947 and 1950, which created a need for more office space. The Research Division therefore moved

from the old house on Michigan Street to a larger old house on Government Street, where it would remain for the next 30 years.

The small size and location of the Research Section probably had a bearing on it lacking an effective planning process. During the 11 years of the Economics Division, the staff increased gradually from three (Garman, Allen, and MacBean) in 1939, to five in 1945, to 12 in 1950, with only one person stationed outside of Victoria (in Prince George). The number of staff may not have warranted the preparation of a detailed strategic plan that would address all provincial needs, but even a general plan with broadly stated goals and priorities did not exist.

Instead, it would appear that the research projects during the early 1940s reflected the interests, experience, and training of the individual researchers, as this sampling from 1945 illustrates:

Garman – silviculture research (Douglas-fir)
Allen – reproduction (Douglas-fir)
MacBean – logging utilization (Lower Coast)
Spilsbury – ecological classification (Douglas-fir)
Alexander – growth and yield

This pattern of piecemeal planning initiatives from below more or less became the unwritten policy for the Research Division of the 1950s and 1960s.

During the 1940s, the Research Section (under the Economics Division) had functioned rather in isolation from the rest of the B.C. Forest Service, with the exception of the Reforestation Division, which was conveniently headquartered in Victoria. It soon became apparent, after Research again achieved the status of a division, that the same lack of communication with the forest districts would not improve in any significant way unless steps were taken by the Research Division itself to overcome this major failing.

The most obvious solution was to post a researcher in each forest district, and this is what Spilsbury decided to do. Getting the resources to pursue this course of action, however, was another matter entirely. It took years to implement—ironically, in a decade when scores of foresters were being hired for the expanded Inventory Program.

One researcher had been posted to Prince George in 1948, but his primary responsibility was to re-open the Aleza Lake Experiment Station and take charge of its operation. The first regional research officer was Bruce Clark, who filled the position in Kamloops in 1954, followed in 1956 by Mike Stewart's posting to Nelson, and in 1957 by Keith Illingworth's posting to Prince Rupert. A regional research officer was not posted to Vancouver because of its proximity to Victoria.

Problems associated with obtaining adequate resources and funding continued in all aspects of research. For example, in connection with reforestation and nursery research it was recognized that a soil and plant tissue analytical laboratory and controlled-environment chambers were highly desirable, if not indispensable. Finally, in 1960, a small attic room above the B.C. Forest Service garage was allocated to the Research Division for conversion to a soil analysis laboratory. Five years later, a room on the ground floor was also made available, in which three growth chambers were housed. In 1970, 0.8 ha of provincial land off Wilkinson Road, in Saanich, were secured, and a building was constructed to house a laboratory and greenhouse. Many improvements have been made since that time and the facility is now called

the Research Branch Laboratory.

The lack of adequate funds and staff in the Research Division did not permit researchers to address new reforestation problems. In frustration, the Reforestation Division began conducting research independently, utilizing operational staff on a part-time basis.

During most of the 1950s and 1960s, annual budget figures were established with a minimum of planning and supporting data. To begin with, the Research Division would usually be informed that no increase would be possible. Sometimes expenditures would remain within this limit, but there was usually an urgent need for more funds, so the order of the day was to seek other sources of funds. This was sometimes called the "scrounge factor." The first step in the process was, quite often, to seek help from the Reforestation Division.

A fiscal lifeline had long existed between the research and reforestation components of the Economics Division. This arrangement started in 1941 when the Cowichan Lake Research Station was used as an operational reforestation camp, and all of the camp expenses were underwritten by reforestation projects. When the Reforestation Division was created in 1946, a commitment was made to continue to subsidize the operation of the camp at Cowichan Lake, and the arrangement continued until 1971. During that 25-year period, the costs of many improvements were borne by the Reforestation Division, such as the construction of a kitchen and dining facility in 1953, and a dormitory in 1957. However, over and above these expenditures, the Reforestation Division frequently assisted the Research Division in supplying manpower and equipment.

From time to time, the Research Division also relied on other sections of the B.C. Forest Service to supplement its budget. For instance, road construction at the Aleza Lake Experiment Station was provided by the Engineering Division, and vehicles were occasionally provided by individual forest districts.

Sometimes, one had to be innovative and resourceful in order to obtain adequate funding. For example, the coastal Douglas-fir Tree Improvement Program expanded steadily during the 1950s and 1960s, and soon reached the stage where a large area of cleared land was required at the Cowichan Lake Research Station, for demonstration purposes as well as for clone banks and progeny testing. The cost of clearing land was high, particularly since roots and stumps had to be removed to minimize root disease infections. For several years money was not available, so finally some small patches of old-growth timber were harvested and the log sale revenue was spent to clear land.

Reliance on outside sources of funds became a long-lasting trademark of the Research Branch. Even as recently as 1979, only 52% of research expenditures were covered by their budget. The remaining 48% came from the Intensive Forestry Vote and from the Silviculture Branch.

Until the 1970s, meaningful communication between the Research Division and the forest districts was minimal, as far as the definition of research needs and priorities was concerned. The district staffs should presumably have constituted the primary client group for the application of research results, but contemporary practices focused on the sale of timber and on forest protection. Foresters in the districts applied very little pressure for more research. Indeed, had they done so, the Research Division would have been hard-pressed to find the necessary resources to respond.

The inception of the policy to post a regional research officer in each district office gradually helped improve the situation.

Another initiative taken in the 1970s by the Research Division was the structuring of a research advisory committee in each forest district. Results were very slow in coming, but by the late 1970s, district staff appeared to take this approach more seriously, and a provincial research advisory committee was created to gather and co-ordinate research needs and priorities of all regions, on a provincial scale.

During the late 1940s, hiring of professionals to fill research positions had been conducted in an unconventional manner. The need for a specific researcher was not identified, and as a consequence, there was no job competition or a statement of desirable skills and capabilities. Hiring usually took place when a forester with war service was job hunting, and had expressed an interest in forest research.

As the years went by, the recruitment policy evolved, and eventually job openings were advertised. But filling research positions was often a difficult process. Many young foresters looked on the Research Division as a blind alley in terms of promotional opportunities, as compared with most other sections of the B.C. Forest Service. This perception was also reflected in a high personnel turnover. From 1950 to 1965, of 18 researchers hired, only seven stayed with the Research Division. There were other contributory factors to this high turnover, too, including the lack of support for post-graduate education, and the lack of a research policy statement from the senior executive level.

To a great extent, the role of the Research Division evolved from within. For example, when Alan Fraser joined the B.C. Forest Service in 1946, he worked only on growth and yield research. He soon launched a self-study program in biometrics, with some help from professors at the University of Victoria. In 1953, he attended a 3-month course designed for U.S. Forest Service personnel in Washington, D.C. His duties within the Research Division expanded as his competence grew, and he became a consultant to many sections of the B.C. Forest Service.

The following quotation from the 1954 *Annual Report* of the Department of Lands and Forests summarized the extent of Fraser's role:

> *The technical adviser wrote and advised on nine working plans involving problems of the Surveys Division, Working Plans Division, Management Division, Kamloops Forest District, Prince George Forest District, as well as the Research Division. The value of a technical adviser was definitely established by the many requests for assistance and advice from both within and without the B.C. Forest Service on matters of mensuration, experimental design and statistical analysis.*

Although the Research Division's human resources did not appreciably increase during the 1960s (there were 15 professionals in 1960 and 17 in 1969), several changes did occur in the deployment of those resources. A tree physiologist was hired to study nursery problems. More resources were allocated to the Tree Improvement Program, which was expanded to include three tree species: coastal Douglas-fir, interior spruces, and lodgepole pine.

The abandonment of the Aleza Lake Experiment Station in 1963 was a major event. The following paragraph appeared in the *Annual Report* of the B.C. Forest Service:

Maintenance of the Aleza Lake Experimental Station as a research centre has become increasingly expensive over the years, and latterly this has tended to restrict development of the regional research programme. It was decided to close down the station for the next decade and direct funds and effort thus saved to regional studies. The area will continue to be managed by the district on a sustained yield basis, and it is hoped to continue silvicultural investigations, but on a more restricted scale.

Conversely, the Cowichan Lake Research Station maintained its viability, and continued to expand its services to the Tree Improvement Program. This continuance during a period of "tight" money was attributed primarily to the financial support of the Reforestation Division.

The Red Rock Nursery and Research Centre near Prince George opened in 1967. Although in title it was a joint venture of both the Research and Reforestation divisions, most of the facility costs were underwritten by the Reforestation Division.

In the early 1970s the Research Program began to expand. In addition to an increase in funding, it was now permissible to contract research functions rather than having to create new positions in the civil service. In the late 1970s the expansion continued at an accelerated rate. This situation was made possible by a re-organization of the entire B.C. Forest Service. The Research Branch experienced a major expansion in terms of both positions and funding. In the spring of 1980 it moved to new headquarters in downtown Victoria, ready for new challenges. But that's another story . . .

SUGGESTED REFERENCES

Barr, P.M. 1927. Summary of forest research in British Columbia, 1921–1927. B.C. Forest Branch, Victoria, B.C.

Booth, J.K. 1985. The life and times of Martin Grainger. BSF thesis. Faculty of Forestry, University of British Columbia, Vancouver, B.C.

Casamajor, P. (editor). 1965. Forestry education at the University of California: the first fifty years. California Alumni Foresters, Berkeley, Calif.

Drushka, K. 1995. H.R.—a biography of H.R. MacMillan. Harbour Publishing, Madeira Park, B.C.

Fulton, The Hon. F.J., A.S. Goodeve, and A.C. Flumerfelt. 1910. Final report of the Royal Commission of inquiry on timber and forestry, 1909–1910. King's Printer, Victoria, B.C. <http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Rc/Rc002/Rc002.pdf>

Gayton, D. and D. Wrangler. 2003. A proud tradition: history of the Nelson Forest Region, 1897–2003. Ministry of Forests and FORREX, the Forest Research Extension Partnership, Nelson, B.C. <http://www.for.gov.bc.ca/hfd/library/documents/nelsonproud.pdf>

Grainger, M.A. 1908. Woodsmen of the west. Reprinted in 1994 by Horsdal & Schubart Publishers, Ltd., Victoria, B.C.

Grainger, M.A. 1908. Woodsmen of the west. Reprinted in 1996 by McClelland & Stewart Inc., Toronto, Ont.

Mulholland, F.D. 1937. The forest resources of British Columbia. British Columbia Forest Service, Department of Lands. King's Printer, Victoria, B.C.

Murray, Peter. 1994. Home from the hill—three gentlemen adventurers. Horsdal & Schubart Publishers, Ltd., Victoria, B.C.

Schmidt, R.L. 1992. The history of Cowichan Lake Research Station. Research Branch, Ministry of Forests and the Forest History Association of British Columbia. Miscellaneous Report, Research Branch, Ministry of Forests, Victoria, B.C. <http://www.for.gov.bc.ca/hfd/pubs/docs/bro/bro10.htm>

Schmidt, R.L. 1993. The Aleza Lake Experiment Station (1920s and 1930s). Research Branch, Ministry of Forests and the Forest History Association of British Columbia. Miscellaneous Report, Research Branch, Ministry of Forests, Victoria, B.C. <http://www.for.gov.bc.ca/hfd/pubs/docs/bro/bro02.htm>

Schmitz, H. 1973. The long road travelled: an account of forestry of the University of Washington. Arboretum Foundation, University of Washington, Seattle, Wash.

Smith, J.H.G. 1990. UBC Forestry 1921–1990: an informal history. Faculty of Forestry, University of British Columbia, Vancouver, B.C.

Sloan, The Hon. G.McG. 1945. Report of the commissioner relating to the forest resources of British Columbia. King's Printer, Victoria, B.C. <http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Rc/Rc003/Rc003.pdf>

Sloan, The Hon. G.McG. 1957. Report of the commissioner relating to the forest resources of British Columbia. Queen's Printer, Victoria, B.C. Volumes 1 and 2. <http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Rc/Rc004/Rc004.pdf>

Young, W.A. 1982. E.C. Manning, 1890–1941, his views and influences on British Columbia forestry. BSF thesis. Faculty of Forestry, University of British Columbia, Vancouver, B.C.

The biographical sketches have been divided into two parts, to conform to the organization of the main text. Part 1 includes those individuals who worked in research during the 1920s and 1930s, regardless of the duration of their employment. This section is much larger than Part 2, for several reasons. During the early days, the research staff did not exceed 10 at any given time. (Another reason for comprehensive coverage of the researchers during the 1920s and 1930s was my need to obtain information. It was a profitable experience for me to dig up information about these individuals, most of whom I had never met.)

Part 2 features researchers who worked after 1940. It is a much more selective and smaller treatment, by necessity, since staff increases and a high turnover after World War II resulted in a very long list of researchers. In preparing Part 2, it was necessary to make arbitrary decisions about whom to include. I settled for those long-term researchers who had contributed significantly to the development of the Research Division from 1940 to 1970—the period subtitled "Dedication and Frustration."

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J.L. Alexander. (Source: Obituary in the *Forest Service Newsletter*, April 1951)

James L. (Alex) Alexander (1894–1951)

James L. (Alex) Alexander was widely known throughout the B.C. Forest Service during his career as a researcher in British Columbia. He was highly regarded as a forest mensurationist, acknowledged as a trailblazer in several fields of forestry research, and well-respected for his prowess as a sports fisherman.

Alexander was born in 1894 in Mono Road, Ontario. After completing high school, he entered the University of Toronto. His studies in Forestry were interrupted by several years of military service during World War I, where he attained the rank of captain in the Corps of Royal Canadian Engineers. During the summers of the years in which he attended university, he worked in the field for the Wayagamack Pulp and Paper Company in Quebec. Immediately upon graduation from the University of Toronto in 1921, he came to British Columbia and joined the B.C. Forest Branch.

Alexander was the first person to be hired as a full-time researcher, more than 85 years ago. During his first year in British Columbia, Alexander was attached to the Kitimat cruising party. Its purpose was to make growth studies to help in estimating whether potential increment would support a pulp mill (*Annual Report*, Forest Branch, 1922).

Over the next several years Alexander tackled a variety of research projects in mensuration, silviculture, and fire protection. In 1922, he worked only in the Interior of the province, primarily on studies of ponderosa pine. In this work, he was temporarily assisted by forest district personnel, including S. Hope and Dick Orchard. Field work was conducted over a large area, extending from Chinook Cove, north of Kamloops, to Gateway on the International Boundary. A report, "Practical results of investigative work on western yellow pine," was presented at the Annual Conference of District Foresters in Victoria, February 19–23, 1923 (*Root and Branch*, March 1923).

In 1923, Alexander launched two investigative field parties in the Vancouver Forest District. The first party addressed "waste occasioned by steam operations," while the other was "carrying on reproduction and sample plot studies to cover the main types of the Southern Coast" (*Root and Branch*, May 1923).

In the *Root and Branch* issue of July 1923, Alexander stressed the need for more research, especially for permanent experimental plots. He also stated, "the time seems to be at hand for the establishment of experimental stations and nurseries to supply plants for restocking areas on which natural regeneration is not possible."

In 1924 he studied slash disposal, natural regeneration, and forest protection in the Vancouver Forest District, and produced preliminary yield tables for Douglas-fir. He noted that "Some 40,000 to 60,000 acres are cut over

annually on the Coast alone, the replanting of which would require an annual budget of $750,000 to $1,250,000. Can this expenditure be avoided and a new crop still assured is the question facing our investigation." Among other things, he compared the effects of spring, summer, and fall slashburns, and advised on the need for seed trees. The newly hired Arthur Pickford was Alexander's assistant in much of this work.

During 1925, Alexander supervised a mensuration project that culminated in the production of volume tables based on current standards of utilization, and three projects addressing forest fire occurrence, behaviour, and control.

In 1926 he continued his studies on forest protection research, while Cy Phillips worked on a fire behaviour project under Alexander's supervision. In the same year, another mensurationist, George Barnes, was added to the staff to initiate growth and yield studies in spruce–balsam types of the Central Interior.

In 1927, Alexander left the B.C. Forest Branch to accept an assistant professorship in the fields of Silvics and Silviculture at the University of Washington. His departure was co-incidental with the formation of the Research Division, and may in fact have been triggered by the promotion of Percy Barr—a younger and less experienced researcher—to the senior research administrative post. There may, however, be no substance to this observation, as the following quotation from the 1927 *Annual Report* of the Forest Branch would seem to suggest:

> *Owing to the resignation of J.L. Alexander, who had charge of Coast work, a reorganization had to be undertaken, all the research projects throughout the Province being brought together in one division of the Branch.*

As the years went by, Alexander maintained contact with the Research Branch. In 1929 his signature, with those of his wife and son, appear in the visitor registry of the newly opened experimental station at Cowichan Lake. Evidently he was pleased with the progress made there, for on May 22, 1930, he returned with 26 forestry students from the University of Washington. This visit set a precedent, and was followed a year later by a group of forestry students from the University of British Columbia. This tour was well-documented by Professor F.M. Knapp, and well-illustrated with many photographs by James D. Curtis.

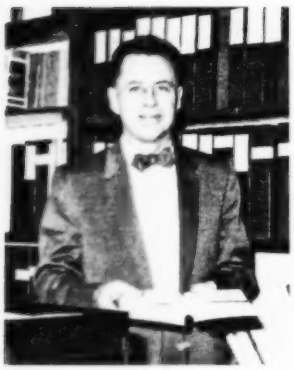
Alexander visited the Cowichan Lake Research Station again on June 19, 1933, with Thornton Munger of the U.S. Forest Service. While three visits seem inconsequential today, it must be remembered that transportation to the station in those days was not a simple matter: until 1936 the only access was by boat from the village of Lake Cowichan.

Barnes resigned from the B.C. Forest Branch in 1936 to teach at the University of Utah, leaving the Research Division without the services of a forest mensurationist. Very restricted budgets during the Depression precluded replacing Barnes, so the division asked him to return to British Columbia to tackle a high-priority job during the summer of 1940.

Funding finally became available in 1942, and a replacement was hired—none other than J.L. Alexander. When he arrived, he found that the Research Division had lost its identity, and had become part of the Economics Division. In 1947, Alan R. Fraser was hired to assist Alexander with mensuration studies, and Fraser headed this section after Alexander's death in 1951.

In total, Alexander conducted research for only 15 years in British Columbia. However, he made many contributions as a researcher, and in laying the foundation for the Research Branch. Nothing that could be added here could be as expressive as the final paragraph in his obituary, which appeared in the *Forest Service Newsletter* of April 1951:

Alex was widely recognized as one of the best qualified mensurationists on the Pacific Coast. He was a finished forester, who still could see the trees, mills and lunch pails through the haze of his formulae and theory. He was a tower of strength to his colleagues, and leaves a hole in the B.C. Forest Service which will be difficult to fill. He will long be remembered by a host of friends of every social, professional and cultural strata. Alex had a pre-eminent faculty for making friends in the most likely and unlikely quarters. His infectious good nature, his happy chuckle, his preposterously perfect whiskers, his sympathetic interest in his friends' interests, his equally enthusiastic reactions to a forest problem or a fishing trip, and a dozen other engaging traits, will be sorely missed.



George Allen, 1966. (Source: University of British Columbia Faculty of Forestry)

George S. Allen (1912–1968)

Although George Allen carved out a very successful career as a professor and dean at the University of British Columbia, his first love was forest research. His devotion to it began during the difficult days of the Depression, when he worked for the Research Division of the B.C. Forest Branch in the summers of 1934, 1935, and 1936. In those same years, he was lecturing and doing graduate studies during the winters.

Allen was born on January 21, 1912 on the Isle of Wight in England. In 1915, his family immigrated to Canada, settling in Vancouver. Allen graduated from Magee High School in 1927, at the age of 15. His choice of a career in forestry was influenced by a guest lecturer who spoke on forestry, and by his mother, who was an avid gardener with a keen interest in botany.

Allen obtained his BASc in Forest Engineering in 1933 at the University of British Columbia, with Honours. His first job after graduation was with the Capilano Timber Company, where he worked as a spark chaser and constructed telephone lines. As an indication of the hard times during the Depression, he said: "In four months I netted $75 after paying for woods clothes, logging boots, and board."

Allen earned his MASc at the University of British Columbia in 1935, and was able to obtain a position with the Research Division of the B.C. Forest Branch in 1937. His initial research involved studies of the life history of seed production of Douglas-fir in relation to weather and other factors. He pursued graduate studies at the University of California in the winters of 1937, 1938, and 1939, aided by a scholarship and two fellowships. He obtained his PhD in 1945, specializing in Botany and Plant Physiology. He then left the Research Division to take on a teaching job at the University of British Columbia as an associate professor.

The year 1945 also marked major expansion in class sizes at the university, as many war veterans extended their education. These were challenging times for the small Department of Forestry in the Faculty of Applied Science, and Allen rose to the occasion. He was a source of inspiration for the hundreds of students who benefitted from his influence during his tenure. He became a professor in 1948 and dean of the new Faculty of Forestry in 1953.

In 1961, Allen decided to leave the university and take up his research interests again. He accepted the position of director of forestry research for Washington and Oregon with the Weyerhaeuser Company. Unfortunately, Allen developed a serious health problem, and gave up that position in 1966. He then returned to Canada to become a resident scientist and section head with what is now the Canadian Forest Service. Allen's heart condition worsened, and he died suddenly on September 4, 1968 at the age of 56. Despite a relatively short career, Allen had accomplished much as a scientist and as a teacher, and he left many friends behind.

George Barnes, 1935. (Source: May Barnes)

George H. Barnes (1901–1974)

George Barnes was born on February 25, 1901 at Rossland, British Columbia. After attending the University of British Columbia from 1919 to 1921 to study Engineering, he transferred to the College of Forestry at the University of Washington, from which he graduated in 1924 with a BSF degree.

Barnes was hired as a junior forest mensurationist in 1926 by the B.C. Forest Branch, to fill the need for volume and yield tables for the predominant tree species in the Central Interior of the province. He spent the summer at the recently established forest experimental station at Aleza Lake, where he established 12 permanent growth and yield plots in mature spruce–balsam forests. He also established four permanent plots in cutovers as the basis for a detailed study of natural regeneration. His assistants in the field were Fin McKinnon and Braham Griffith. Eight permanent growth and yield plots were also established in young lodgepole pine stands off the station.

During the following winter, George constructed volume tables for balsam and lodgepole pine, and collaborated with Percy Barr in the construction of interior spruce volume tables.

From 1927 to 1936, Barnes continued in forest mensuration research. Barnes entered the University of California at Berkeley in 1928 and obtained his MSc in Forestry in 1929. The title of his thesis was "Yield tables for lodgepole pine in British Columbia."

After Alexander's departure in 1927, Barnes' responsibilities had broadened to include research on coastal tree species. He produced yield tables for coastal Douglas-fir, interior spruce, and western hemlock. To achieve this, he extended the database by establishing many permanent growth and yield plots. For a short time Jim Curtis assisted in plot establishment in coastal Douglas-fir.

In 1936 Barnes contributed to a comprehensive report entitled "Volume, yield and stand tables for some of the principal tree species of British Columbia" and then on September 1, he resigned to accept an appointment as an assistant professor at the University of Utah. His resignation was triggered by declining funds to support research, and by his interest in teaching. The Research Division was now without the services of a qualified forest mensurationist.

In 1940, the B.C. Forest Branch was under pressure to allow logging of a 90-year-old Douglas-fir forest in the Fraser Valley. Barnes was hired as a consultant to evaluate growth data and make recommendations on the case for immediate logging. He advised that, "these stands should not be utilized for another 30 years, and even 60 years could be justified."

In 1942 he embarked on a doctoral program at Duke University and earned his PhD in 1946. His thesis was titled "Development of mixed even-aged stands of Douglas-fir and western hemlock."

In 1943 he left the University of Utah to accept a teaching position at Oregon State University. In addition to his teaching role, he soon took on additional responsibilities, overseeing the school's land tracts and serving on the faculty council. During the summer months, he frequently worked on forest mensuration projects for the U.S. Forest Service.

In 1954, Barnes became assistant director of the Forest Research Division of the Agricultural Experimental Station at Corvallis, Oregon. In later years he served as assistant director of the Forest Science Department. He retired on July 1, 1966. He died on August 11, 1974 at Corvallis.

Percy Barr, 1955. (Source: Helen Barr)

Percy M. Barr (1897–1960)

Percy Barr was born in Waterton, Connecticut on July 22, 1897. His family soon moved to Canada, where he completed his public schooling in Nova Scotia and British Columbia. In 1915 he joined the Canadian infantry and saw action in France and Belgium. At the beginning of 1918, he transferred to the Royal Flying Corps of Great Britain, becoming a pilot and second lieutenant.

In 1919 he worked on a forest survey for the B.C. Forest Branch, and he continued to do so each summer while attending the University of British Columbia. In 1923, while still a student, he was promoted to party chief and placed in charge of a 12-man crew conducting a forest survey of the Horsefly River watershed.

Barr graduated in 1924 with a BASc in Forest Engineering. The B.C. Forest Branch decided that year to establish a forest experimental station in spruce–balsam forest types in the Central Interior of the province. Barr was given responsibility for conducting a general survey of forests and cutovers and selecting a forest suitable for the station. He selected 2590 ha near Aleza Lake, 55 km east of Prince George.

In 1925, Barr was put in charge of development operations at the Aleza Lake Experiment Station. He supervised road and trail construction, campsite preparation, and the construction of a building. The primary objective of this station was to develop a demonstration forest, administering it on the basis of sustained yield with regular annual harvests. The initial estimate called for an annual cut of between 4530 and 5890 m^3. To facilitate logging plan development with minimum delay, a forest inventory of 647.5 ha was completed in 1925 by a four-man crew (Eric Garman, Ken McCannell, John Dawson, and Cedric Walker) under Barr's supervision.

Barr accomplished a great deal between 1925 and 1929. He attended Yale University (while still an employee of the B.C. Forest Branch) and obtained his MF in 1925. He was promoted to officer in charge of the newly created Research Division in 1927. He was instrumental in expanding research facilities and housing for researchers and staff at Aleza Lake, and for developing a second experimental station at Cowichan Lake in 1929. Along the way, he undertook post-graduate studies at Yale University and earned his PhD in 1929. These studies involved research at Aleza Lake, and resulted in the publication of "The effect of soil moisture on the establishment of spruce reproduction in British Columbia" (*Yale University School of Forestry Bulletin 26*, 1930).

Barr was an enthusiastic and energetic extrovert. He was active in amateur

theatre in Victoria, and even convinced some of the more introverted staff members to try their hand at acting. He also convinced ordinary citizens to visit the Cowichan Lake Research Station to see the activities that were going on, even though the station was accessible only by boat.

In Vancouver on October 21, 1929, Barr spoke at a meeting of the Canadian Society of Forest Engineers (which later became the Canadian Institute of Forestry), stressing three features of the Research Division, which, he said:

- had recognized the need for highly trained researchers. "We have encouraged them to seek advanced and specialized training in scientific forestry, beyond the regular undergraduate training of their university";
- had selected and developed working centres at Aleza Lake, Cowichan Lake, Green Timbers, and the Shelbourne Street experimental nursery; and
- had understood "that the best policy is to study basic problems rather than to make superficial statistical studies."

By 1931, the Depression imposed budgetary constraints that affected research programs. Nevertheless, Barr was still optimistic, and with the co-operation of the Elk River Timber Company, he investigated the establishment of an additional research station on 405 ha of land near Campbell River. This land was "permanently set aside for experimental work in reforestation."

Meanwhile, the Research Division was losing staff members—victims of Depression-era constraints. Research activities at both Cowichan Lake and Aleza Lake were reduced to a maintenance level, and the lumber market was so depressed that all logging ceased at Aleza Lake. Plans for developing a sustained-yield demonstration forest were shelved. By 1932, Barr finally realized the hopelessness of the situation, and looked elsewhere for employment. He had little difficulty in obtaining a teaching position at the University of California at Berkeley, because a PhD from Yale was highly regarded. The Research Division lost its first senior administrator after a very productive 5-year tenure.

At Berkeley, his talents as a teacher were soon recognized, and within a few months he was offered a continuing appointment. In *Forestry Education at the University of California: The First Fifty Years*, published in 1965, Paul Casamajor observes this about Barr:

During his academic career his interests broadened increasingly from forest biology to include the economic and business aspects of forestry. Perhaps his greatest contributions to this latter area were in his teaching, including his published outlines of forest mensuration and forest management which are the distilled essence of these central topics in forestry. A demanding instructor, he communicated his passion for organization and his insistence on precision and accuracy to even the more reluctant of his students.

Early in his association with the University of California, Percy Barr assumed responsibility for the management and development of Blodgett Forest Research Station, the principal field experiment station of the School of Forestry. The time and interest which he devoted to this project over a 20-year period provided the school with an increasingly valuable facility for research and teaching. The long-term experimental work that he initiated there will serve as a continuing monument both to the man and to his concern for professional practice thoroughly grounded in research.

Barr's ties with British Columbia were never totally severed. In the mid-1930s, the University of British Columbia sought his advice about the future of forestry education at the university. He prepared two reports, in December 1936 and February 1937, which recommended initiating a teaching program in Technical Forestry, in addition to the existing degree in Logging Engineering.

Barr foresaw the involvement of the United States in World War II, and in July 1941, he took leave from his teaching position to join the armed services. According to Casamajor:

He went on active duty as a captain in the U.S. Army Air Force in August 1941. Assigned to intelligence duty, he served in Washington, North Africa, and Italy. By 1944, he had risen to the rank of colonel and became assistant chief of staff, intelligence, of the 15th Air Force. For the service he rendered, he was awarded the Legion of Merit and the Bronze Star by the United States, the Croix de Guerre with Palm by France, and the Order of the British Empire.

Upon his return to the University, his organizational abilities and the wide respect which he commanded among the faculty were recognized in a series of special assignments, beginning with appointment as associate to vice-president and provost in 1947. These duties culminated in 1950 with service as chairman of the Committee on Courses and Instruction, chairman of the Committee on Schedule, member of the Committee on Privilege and Tenure, chairman of the Committee on Building and Campus Development, and chairman or member of three additional committees within the College of Agriculture. Simultaneously he served as chairman of the Berkeley Chapter and vice-chairman of the Pacific Area Regional Advisory Council of the American Red Cross.

The slowly developing symptoms of Parkinson's disease forced his gradual retirement from this remarkable array of University and community services. Undaunted and unyielding, Percy Barr concentrated his efforts on his teaching and his studies of the business aspects of forestry. In 1953 he inaugurated the first course in industrial forestry to be given in the United States.

With his wide knowledge of forestry operations in the United States and Canada, combined with his ability to perceive the important, he came to occupy a special role in the School of Forestry. The twinkle in his eyes, the quick bite of his humour, and his deep interest in the development of his profession never deserted him. During these days, his cheerful accommodation to the irksome problems of declining physical ability must have challenged and inspired the spirit of his students as effectively as his seminars challenged their intellects.

Following one of his usual full days of work at his office, he died quietly in his sleep early in the morning of August 27, 1960.

To his associates and to his students, he contributed much in understanding of forestry, in approaches to organizing tasks, and in encouragement in the development of individual abilities.

The success achieved by Barr after his departure from British Columbia in 1932 represents a measure of the loss sustained by this province. We have no means of assessing what Barr might have achieved, had he decided to ride out the Depression in the Research Division. But we do know that he was an enthusiastic and energetic fighter. He certainly would have done his utmost to prevent the almost total disintegration of the division, and the complete loss of its identity in 1939. In 1945, the University of British Columbia honoured him with a DSc degree.

Jim Curtis (with pipe) and Jim Robertson (on the left), 1932. (Source: Jim Curtis)

James D. Curtis (1905–1996)

Jim Curtis was born in Vancouver on June 6, 1905. After completing high school, he worked as a deckhand for several summers aboard the vessel *Metra*, which was used on geodetic (land) surveys. He became quite familiar with the North Coast, particularly in the vicinity of the Skeena River.

In 1927, while attending the University of British Columbia, Curtis got his first experience in the woods. It was a summer job working as a chokerman for Bloedel, Stewart and Welch at Camp Three, near Campbell River. These 4 months helped Curtis make some decisions about his future in forestry:

It was my first opportunity to obtain a first-hand view of a logger's life in a railway camp. The lifestyle and surroundings did not appeal to me. The layout of these old camps was strictly functional, with very stark surroundings. The life of a logger was regimented by various noisy signals—a locie engine whistle blasted us out of bed at an ungodly hour, a gut hammer called us to breakfast at the cookhouse, and another blast from the locie warned us to get aboard the crummy and head out to work.

The meals were great, but we were expected to wolf them down and leave the cookhouse as soon as possible. No one dared to linger over a coffee and start a conversation after dinner.

If you ignored the blanket-covered poker table in the drying room, and a weedy horseshoe pitch, you could say that there was absolutely no attempt to provide for recreation.

I didn't care for logging camp life, but more importantly, by the end of the summer I came to realize that I had identified my place in forestry. I was definitely more interested in learning how to grow trees than in the engineering of transportation and logging systems used in clearcut operations.

Curtis graduated with a BA from the University of British Columbia in 1929 and obtained an interview with Percy Barr, who was then in charge of the Research Division. The result was a summer job as well as the beginning of a long-lasting friendship with Barr. They maintained a correspondence for many years while both were Forestry professors in the United States.

Curtis' first summer in the Research Division was spent mostly at the newly established Cowichan Lake Research Station. He soon got to know all of the researchers involved in coastal forestry. Most of the time he assisted Stig Schenström in establishing the first coastal thinning trials in the province, but from time to time he also assisted Cliff Riley, George Barnes, Arthur Pickford, and Eric Garman:

I was very impressed with the amount of activity and the esprit de corps which prevailed in the Research Division at that time. Apparently this recently established section of the B.C. Forest Service enjoyed strong support from senior B.C. Forest Service staff members, both in terms of budgetary commitment as well as in the recognition of the role which the Research Division was expected to play in forest management. As time passed I began to realize that Percy Barr, in a dynamic leadership role, was largely responsible for generating this level of research support.

Curtis returned to the University of British Columbia that fall, and obtained his BASc in Forest Engineering in 1930—the only graduate in the 1930 class. As he put it, "not only was I head of the class, but I have had no difficulty in attending a class reunion for the last 66 consecutive years." Without

any delay, he obtained a position in the Research Branch and spent much of the time assisting Stig Schenström with his silvicultural research projects. In the fall, Jim Curtis worked at the Shelbourne Street research nursery on seedling lifting operations.

Additional budgetary cutbacks were made toward the end of 1931, and staff reductions began. Stig Schenström, not being a Canadian citizen, was the first to go, in November. A year later, Curtis was also laid off. In 1932, Percy Barr, now aware of a desperate situation, left of his own accord to become a professor at the University of California at Berkeley.

When Curtis left the Research Division, he decided to do some travelling, in the hope that economic conditions would improve by the time he returned:

My urge to travel largely resulted from encouragement from another researcher, Jim Robertson, who had returned in the spring of 1931 from Australia, where he had worked for the Queensland Forest Service. Jim had given a glowing account of the forests and the climate and the beaches. I bought a one-way ticket to Australia. I also took along the names and addresses of forestry people from different countries that I had met when they had visited the Cowichan Lake Research Station. By contacting these people as my journey unfolded, I was able to see much more forestry and meet more people than would have been otherwise possible, and also keep my expenses down by accepting their hospitality.

It took me eight months to travel around the world, and it was both an exciting and educational experience for me. Unfortunately, economic conditions in British Columbia did not improve in my absence. I could find no job, so I applied for a scholarship at Harvard University. I was successful, and spent the winter there. I returned to British Columbia in 1935 with an MF degree and resumed my search for a job.

Curtis could find only a temporary job, as a timber cruiser in the Forest Surveys Division. He spent an enjoyable summer on the Upper Arrow Lake survey. When the job was completed, it was evident to Curtis that he had to look for employment outside the province.

At Harvard University, during the previous spring, one of his professors mentioned that a teaching position would be coming available at each of Pennsylvania State University, the State University of New York, and Massachusetts State College. Curtis was already familiar with the Forestry School at Massachusetts State College, so he applied there and was accepted. With some regrets he decided to leave British Columbia, and 30 years would pass before Curtis would again reside in his native province. He taught in Massachusetts for 4 years and then took up a professorship in the College of Forestry at the University of Maine. He taught there until 1947.

Although by then he had been teaching for 11 years, Curtis was still very interested in conducting research. He was offered a research position by the U.S. Forest Service and he and his family moved to Ogden, Utah, where Curtis began research on ponderosa pine regeneration. In 1961 he was promoted to head of the research centre at Boise, Idaho.

Curtis took early retirement in 1966 and soon returned to British Columbia. One of the main attractions was a home in Comox on a property his father had purchased in 1894:

As a small child and during my school years, our family spent each summer in the cottage my father had built at Comox. As I grew up I got to know all the surrounding

country. I recall that I thought nothing of hiking to Cumberland for a day's outing.

During my 30-year stay in the U.S.A. I had little opportunity to spend much time at Comox. It was good to be back.

During his retirement, Curtis and his wife enjoyed the panoramic view of Georgia Strait, as well as the Beaufort Range on Vancouver Island. The backdrop to their cottage is a fine stand of Douglas-fir that regenerated after his father first cleared the property.

Joe Falconer, 1940. (Source: Joe Falconer)

Joseph G. Falconer (1893–1993)

At 99 years of age, Joseph Garner Falconer could look back with a great deal of satisfaction on an interesting and eventful life, distinguished by many occupations and ventures in business activities. He was born on a farm near Morden, Manitoba on October 8, 1893. When he was 17, he and his father filed homestead claims in Alberta near the confluence of the South Saskatchewan and Red Deer rivers. In the same year, Joe also briefly attended normal school in Winnipeg and got a job teaching in Langruth, a small community near Lake Manitoba.

He describes the experience:

I got $50 a month for teaching and paid $16 a month for board, room, and washing. Nearly all the residents were Icelanders, so fish was my diet six days a week and, if lucky, meat on Sunday.

It was during this time that Falconer planned to obtain a university education on his own. During the next 10 years, he seized every available opportunity to earn money. He lived intermittently on his homestead, operated a water delivery business, built a livery stable at Empress, Alberta, and hauled oats for a Canadian Pacific Railway branch-line construction crew. He built a cottage in Medicine Hat so that his two younger brothers could get an education and he taught school near Maple Creek, Saskatchewan. After that he completed Grade 12 in Medicine Hat and attended normal school in Calgary in order to earn an Alberta teaching certificate. Falconer also bought a tractor plus other machinery, and operated a custom harvesting business while maintaining his homestead farming operation (and later on while attending the University of British Columbia).

Falconer was determined to earn his money honourably. However, while operating his livery stable at the age of 21, he nearly became involved in a bootlegging operation:

A carpenter came along who saw what I was doing and he asked for a job, so I gave him one right away. He suggested that we convert a corner of the livery stable into living quarters for ourselves. I told him I had a cookstove at the homestead, so we hauled it to town and installed it in our new quarters.

The next day along came a chap who said he was a cook—he had cooked in the railroad construction camps. I said I could not afford to hire a cook. He said he did not want any salary, only his board. That suited me fine, and he agreed to help with the water delivery business. Little did I know that he had intentions of also delivering firewater.

I had to get some oats for my feed barn from Medicine Hat, 70 miles away. This new cook asked me to buy two cases of G&W Special rye whiskey for him. This was a new idea to me, but I did it. He was to pay me when I got back, which he did. He got

rid of the whiskey by selling most of it to the freighters. When I learned that he was bootlegging, I told him, "No more of that for me," as it was against the law.

By 1922, Falconer was equipped, both mentally and financially, to enter university. He had decided to become an engineer and registered in the Faculty of Applied Science at the University of British Columbia. In his classes he met several students who planned to become forest engineers, and Falconer's interest was piqued. He was fascinated by the stories they told about outdoor life in the mountainous wilds of British Columbia, so he decided on a career in forestry.

His continued attendance at university still depended on income, so during the first three summers, while attending university, he returned to Alberta to operate his custom harvesting business. Finally, in the summer of 1925, at the age of 31, he got his first experience in the woods, with the Dominion Forest Service on a timber survey southwest of Edson, Alberta.

Immediately upon graduation as a forest engineer in 1926, Falconer worked as a timber cruiser for the Research Division at the Aleza Lake Experiment Station. The primary objective of this station was to demonstrate sustained yield at a practical level, so top priority was given to a comprehensive forest inventory. This would be used in the calculation of a harvesting schedule compatible with sustained-yield management.

Percy Barr was in charge of the station and he encouraged Falconer to pursue post-graduate studies. At the time, Barr himself was doing post-graduate work at Yale University. Falconer decided to follow Barr's lead and made plans to finance his post-graduate studies. He obtained continuous employment with the Dominion Forest Service in Manitoba, first as a timber cruiser, then as a supervisor of the Sandilands Forest Reserve, and lastly, in charge of a pulpwood inventory northwest of Lake Manitoba. In the fall of 1928 he left the Dominion Forest Service to take up his post-graduate studies at Yale University.

Falconer obtained his MF degree in the spring of 1929 and took on a job with the Forest Surveys Division of the B.C. Forest Branch. He joined the Yahk Forest survey crew under Party Chief Ed Bassett. There were 14 men in the crew, including such well-known forestry personalities as Gerry Andrews, Ian MacQueen, Alec Gordon, Bill Hall, Davis Carey, and Bob Wellwood. Falconer still recalls a fly camp with Andrews and two compassmen in the Wigwam watershed when a forest fire suddenly forced them to flee from the valley.

When the field season drew to a close, Falconer returned to Yale University to begin his doctoral studies. In the summer of 1930 he was hired by the Ontario Department of Lands and Forests as a timber cruiser in Algonquin Park. Falconer used this opportunity to obtain field data for his thesis, which addressed growth patterns of eastern white pine found on different soil types. By the spring of 1931, he had completed all of the requirements for his PhD except for his thesis. He left university and worked with a Professor Morgan at the Connecticut Forest Experimental Station and then with two Russian soil scientists at Rutgers University. Finally, in the spring of 1932, 10 years after commencing his university training, Falconer received his PhD from Yale University.

He soon discovered, however, that there were no jobs in Canada for a person with his credentials, despite good connections with the Dominion, British Columbia, and Ontario forest services. During his youth he had taught several times in the public school systems of the prairie provinces, so

he again looked for employment in this "stand-by" occupation. It took several months of searching, but he finally landed a job teaching high school in Swalwell, Alberta, where he worked for 2 years.

Falconer then moved to British Columbia, where he would make his home for the next 5 years, doing a number of different jobs. In 1935 he taught Agriculture at Chilliwack High School. In 1936, he was manager of the Popkum Agricultural Limestone Company. In 1937 he was manager of the fertilizer division of Canadian Industries Ltd. at Chilliwack, and he taught Agriculture and Science at Langley High School. It was during this time that his wife of 20 years died of leukemia.

In 1939, Falconer joined the Royal Canadian Air Force, at the age of 46, and became a personnel selection officer. He was based in London, Ontario and travelled extensively throughout southwestern Ontario with a recruiting team. After 4 years, he switched occupations and taught navigation to air crew personnel in Toronto and Belleville, Ontario.

On his discharge from the air force in 1945, he resumed his teaching position at Langley, B.C. but soon landed a better-paying job as manager of a building supply business in Vancouver. He resigned after 2 years there, when he discovered that he could not get a higher salary, despite having turned the operation into a very profitable business. During his stay in Vancouver, Falconer met a nurse by the name of Etna Pearl Wilson, and they were married on December 26, 1946. They wanted a family, so they adopted a 7-year-old boy and a 5-year-old girl.

Falconer then started a planer mill business in Williams Lake with a partner. Although this business was very profitable, both he and his wife preferred to raise their family in a community with more facilities, so the business was sold, and they moved to Kamloops, where Falconer again took up teaching. He taught Agriculture at Kamloops High School until 1958, when at 65 years of age he was forced to retire.

Falconer had too much energy for that, so he obtained a real estate licence and worked for R.H. Carson Ltd. Because of his background in Agriculture, he was particularly interested in handling ranch properties. In just a few years, he established his own real estate business, Argus Agencies Ltd. At this time his wife worked as a nurse at the hospital in Kamloops.

In 1969 he sold the real estate business and the family moved to Cranbrook. At the age of 76, Falconer launched yet another career. He took a course in investments and became a stockbroker for Doherty Roadhouse in Trail, and then later in Cranbrook. His wife worked as superintendent of nurses at the hospital in Cranbrook. In 1974, Falconer switched to a company with an office in Victoria, and transferred to the capital city. He continued to work as a stockbroker until his 93rd birthday, when retirement finally had some appeal.

Falconer's toughness and resilience gradually faded. He took a bad fall in February 1992, and suffered a broken arm, as well as back injuries. His wife nursed him back to health, and his only concession to his injuries was a half-hearted reliance on a cane as he moved about.

Although Falconer had only a minor career in the B.C. Forest Branch, he could claim some distinction. Before his death on March 2, 1993, just 7 months shy of his 100th birthday, he was the oldest survivor of the Research Division and the Forest Surveys Division. He may also have been able to claim the same distinction for the Dominion Forest Service as well as for the Ontario Department of Lands and Forests.

Eric H. Garman (1898–1993)

Eric Garman, born on March 15, 1898, was the first researcher to spend his entire working career in the Research Division. During those three-and-a-half decades, he was witness to many important events in the evolution of the division.

He experienced adversity early in life. When his family immigrated to Canada from England in 1909, Garman was 11 years old. Additional education was curtailed, because it was necessary for him to get a job to help support the family, so over the next several years, he tried an assortment of jobs in Vancouver, but found none with a promise of a stable future.

World War I was the turning point in his life. As Garman recalled:

In 1915, at age 17, I joined the Canadian Army, and was soon overseas. Fortunately I did not see action in the trenches until 1918. The army gave me my first steady job, but more importantly, once the war was over, it gave me an opportunity to upgrade my education. The Dominion government paid for condensed education classes for war veterans. I obtained my high school diploma and started to make plans for extending my education.

Garman's introduction to the B.C. Forest Branch in the summer of 1921 was the Forest Surveys Division, where he worked as a compassman. He joined the Nass River survey under Party Chief Dick Orchard, who later became chief forester. In the summer of 1922, Garman again worked on the Nass River survey party.

Garman's first research job was in 1923 as a summer assistant to "Alex" Alexander. At that time there were only two full-time researchers in the B.C. Forest Branch, and there was no Research Division.

After three summers in the B.C. Forest Branch, two in surveys and one in research, Garman decided to study Forestry. He enrolled at the University of British Columbia in 1924. When he discovered that the emphasis was on Forest Engineering, he headed south for Forestry Studies at Oregon State University. While Garman was attending university, he spent the summers at the newly established Aleza Lake Experiment Station, east of Prince George. He enjoyed his introduction to the Central Interior of the province:

The Aleza Lake Experiment Station had become a reality in 1924. I was sent there in May 1925 to work on a four-man crew conducting a forest inventory of the station. Development of the station was still in its infancy. A rough wagon road had been constructed from the railway to the campsite. There were a half-dozen tents in a small clearing, which was being enlarged to provide space for more permanent buildings. In 1926 I returned to Aleza Lake Experimental Station and used the camp as a headquarters while I did field work on studies of natural regeneration on cutovers in spruce–balsam forest types. My field assistants that year were Braham Griffith and Fin McKinnon, who worked on alternative weeks for me.

The year 1927 was a banner year for Garman. He graduated from Oregon State University, and the Research Division became a reality in that year, boasting a professional staff of seven researchers. Garman progressed from part-time employee to full-time researcher responsible for his own projects.

In 1927, Garman undertook post-graduate studies at Yale University, earning his MF in 1928. On his return to the Research Division, he began studies

of natural regeneration on logged lands in coastal Douglas-fir types. Field measurements continued for more than two decades before office support became available after World War II. Results were ultimately published by Garman in 1954.

As Garman remembered it, optimism and enthusiasm prevailed in those early days. In 1930 there were nine full-time researchers, two established experimental stations, and the annual budget exceeded $50 000—a figure that surpassed the annual research expenditures of the Dominion Forest Service.

The next phase of the Research Division concerned its disintegration. With great concern, Garman saw the impact of the Depression bring about the departure of his co-workers. He recalled those sad times:

Stig Schenström, not being a Canadian citizen or a British subject, was the first to get laid off. Most of the other researchers left of their own accord, as they could see little future in remaining. The research budget had been reduced to a level which barely allowed the maintenance of existing experiments. One by one they left, most of them getting teaching jobs at American forestry schools. At the beginning of 1936, Barnes, Griffith, and Robertson departed. I was alone in the Victoria office, as Fin McKinnon was in California on educational leave. I might also have departed, but by this time I was married and had established my roots in the community.

Times were tough during the Depression, but Garman could cope. After identifying serious Douglas-fir regeneration problems in the late 1930s, Garman initiated studies in direct seeding. These studies, and Schenström's thinning and pruning studies, were reactivated by newly appointed researchers under Garman's guidance after World War II. In later years, he studied the identification and distribution of interior spruces. His final contribution was a thorough revision of "The pocket guide to the trees and shrubs in British Columbia," which has withstood the test of time with only minor changes in subsequent revisions.

Garman retired in 1962 and enjoyed more than 30 years of retirement before his death on April 1, 1993. During those years he maintained his contacts with Research Division personnel, usually near Remembrance Day, when he would visit the office to sell poppies.

Braham Griffith, 1960. (Source: University of British Columbia Faculty of Forestry)

Braham G. Griffith (1901–1998)

Braham G. Griffith was born on December 10, 1901 in Clydach, Wales. The family immigrated to Canada in 1904, homesteading near Didsbury, Alberta. Seven years later they moved to Fife, a small community in the Southern Interior of British Columbia, near Christina Lake. There was no school at Fife, so Griffith's father started one, and Griffith began his education at age 10. In 1920 the family moved again, this time to Grand Forks, where Griffith attended high school.

Strong family ties with forestry existed because Griffith's father was ranger for the Grand Forks Ranger District from 1920 to 1922. Griffith frequently accompanied him on field trips, where he would run the compass while his father cruised the timber. From time to time, foresters from the Nelson Forest District office or from Victoria would visit the Griffith home. During these visits, young Braham became familiar with many aspects of forestry.

Despite these family roots in forestry, Griffith did not aspire to take it up when he entered university. In 1926 he earned his BA with Honours in

Botany at the University of British Columbia. This was followed by an MA in Botany in 1928, an MF in Forest Soils at Harvard University in 1930, and a PhD in Plant Physiology at the University of Washington in 1939.

Harry Smith, in his 1990 publication *UBC Forestry 1921–1990: An Informal History*, suggested that Griffith must be unique in the history of Forestry schools, since he had never attended a formal lecture in Forestry. Yet he still managed to teach courses in Silviculture, Forest Management, Dendrology, and Forest Protection for three decades at the University of British Columbia.

While attending university, Griffith spent the summers in a variety of occupations. For one summer, he was on a Pacific Great Eastern Railway construction crew. For two summers, he worked for the Union Steamships Company. He recalled that the main cargo was salt for the fish canneries, and beer for Powell River.

Upon graduating in Botany during the spring of 1926, Griffith was hired as a researcher by the B.C. Forest Branch. His initial exposure to forestry was with the Research Division from 1926 to 1936. During most of that time he worked at the Aleza Lake Experiment Station, collaborating with George Barnes, Eric Garman, and Percy Barr.

At the age of 91, when this biographical sketch was done, Griffith was still blessed with a very good memory. He remembered details of incidents that occurred more than 60 years ago, and he recalled that one of his most enjoyable summers in research was 1931. The previous winter, he had spent 6 months in a Victoria hospital with pleurisy. When he finally left the hospital, he was in such poor physical shape that he was sent to the Cowichan Lake Research Station to convalesce, rather than to Aleza Lake where medical assistance was not readily available. It was a car that provided the most enjoyment. Griffith describes the occasion:

Before heading to the Cowichan Lake Research Station I bought a snazzy, brand new, 1930 Ford Model A, jet-black roadster. On weekends, with a companion forester from the station, I would drive this beauty to some of the Vancouver Island towns and beauty spots, where we had a great time.

One of these companions who made weekend trips with Griffith was Jim Curtis, who at the time of this interview was more than 90 himself, and living in Comox. Curtis also has a fond memory of these weekends:

On a Saturday afternoon, Griffith and I were driving from Cowichan Lake to Duncan. We drove the roadster with the top down, as it was a bright and sunny day. It had been a rainy week, and there were many pools of muddy water in low spots of the road. Griffith puttered along at a slow speed to avoid splashing the car. Suddenly a car horn tooted behind us. The driver was anxious to pass, so Griffith graciously pulled over and stopped, unfortunately right beside a huge mud puddle. The passing vehicle accelerated and threw up a shower of muddy water that drenched Griffith completely, including the pipe clenched in his teeth! I learned several new expletives that day, but we still managed to have an enjoyable trip.

Another memorable event at the Cowichan Lake Research Station concerned a camping expedition made by Braham and his wife in 1935, told by Griffith:

All accommodations at the station were in full use, so we set up our tent on the beach at Pick's Point on Cowichan Lake. In those days there was no refrigeration at

the station, so in order to have fresh meat, we brought a live chicken in a gunny sack. When I opened up the sack to take out the chicken for our dinner, it broke free and escaped. It perched on the branch of a tree about 30 feet above ground. My wife hurried to the tent, where we kept a .22 calibre rifle, and with one shot brought the chicken back to earth.

That summer, Griffith nearly drowned in Cowichan Lake. He and another forester, Jim Robertson, were returning by boat to camp after a day's work. Robertson was steering the boat for the first time. For some reason, Griffith stood up just as Robertson swerved the boat sharply to miss a floating log. Griffith tumbled overboard, and got into some difficulty because he was weighted down by a heavy jacket and caulk boots. Flustered, Robertson was unable to manoeuvre the boat to rescue Griffith. Fortunately a Mrs. Simpson, who lived nearby, came out in her boat and saved him.

After leaving the Research Division in 1936, Griffith launched a teaching career that spanned three decades at the University of British Columbia. He retired in 1967, but remained active in many forestry-oriented organizations. At the age of four score and ten, he still managed to attend an annual general meeting of the Forest History Association of British Columbia. Griffith passed away on April 12, 1998.

Angus P. MacBean (1907–1984)

Angus Pearson MacBean was born in 1907 in Medicine Hat, Alberta. He travelled east to study Forestry at the University of Toronto, where he formed a friendship with Gerry Andrews, the only other westerner in his class. They both graduated in 1930, ranked first and second in scholastic standing. Andrews returned to British Columbia and joined the Forest Surveys Division of the B.C. Forest Branch. MacBean became a researcher for the Ontario Department of Lands and Forests but their Research Division was soon disbanded as a cost-saving measure precipitated by the Depression, and MacBean had to look for employment elsewhere. He got a job with the Canadian Splint and Lumber Company in Pembroke, Ontario and there he met his bride, Ann Gougeon.

In 1937, B.C. Chief Forester Ernest Manning was interested in rebuilding the Research Division, which had been reduced to just two foresters: Fin McKinnon and Eric Garman. Manning consulted with Gerry Andrews about selecting a promising research candidate. Andrews recommended his former classmate, and MacBean was hired immediately.

MacBean worked for the Research Division from 1937 to 1945. His research concentrated on two projects: the development of a system for economically using wood that was normally wasted during clearcutting operations in coastal forests, and studying natural regeneration on patch-logged clearcuts.

His research on the utilization of waste material attracted the attention of the forest industry. In 1945 MacBean left the Research Division to accept a job with the Victoria Lumber Company. This firm became a part of the H.R. MacMillan Export Company in 1946 and MacBean was appointed their chief forester in 1947.

After a very successful career, MacBean died on October 30, 1984. On September 19, 1985, the Angus P. MacBean Nursery and Tree Improvement Centre was dedicated to his memory by MacMillan Bloedel Limited, in an official opening ceremony that included the following:

The entire Forestry and Logging Department, consisting of MacBean, Don McColl, Jack McKercher, Frank Whitehouse and a secretary, had an office in the Island Hall Hotel until the office relocated at Harmac in 1950.

In 1947, MacBean and Jack spent five months hiking from Pipestem Inlet to Sydney Inlet on a timber reconnaissance. In those years, cars were not supplied and MacBean commuted by bus to do field projects, including his first company plantation in the Ash River in 1948.

He became chief forester of MacMillan Bloedel Limited in 1951 and later was Manager, Timber and Lands and General Manager, Forestry Group on retirement in 1973. He worked closely with Keith Shaw and Mr. MacMillan on the acquisition of the company's forest resources, and was the key figure in negotiation of MB's forest management licences, development of the management plans and of the operational forestry program. His experience was applied worldwide in developments in Australia, Brazil, Malaysia, and throughout North America.

MacBean made an important contribution to MB's submissions to the 1955–1956 Royal Commission Inquiry into the Forest Resources of British Columbia and to several special inquiries into forest policy.

MacBean was a leader in industrial forest management and was greatly respected in the forestry community for his integrity, professional skills and sense of humour. His achievements were recognized by his peers in the form of lifetime achievement awards from the Canadian Institute of Forestry and the Western Forestry and Conservation Association.

Many of his associates and fellow foresters who enjoyed his friendship, wise counsel and training, join us today, along with daughter Elizabeth Evans, son Donald P. MacBean, and brother Don to dedicate this modern seedling nursery to his memory.

May it meet the standards which MacBean would have set!

Findlay S. McKinnon (1904–1978)

McKinnon was born on July 19, 1904 in Nanaimo, where his father taught school. A year after Fin was born, the McKinnon family moved to the coal-mining town of Cumberland, where his father operated a dry goods and clothing store.

In the summer of 1919 a skinny 15-year-old Fin was shovelling coal into the firebox of a locomotive trailing a long line of loaded coal cars making its way along the landscape between Cumberland and the port of Royston on the east coast of Vancouver Island. Not much was on his mind except his gratitude for landing a job for the summer holidays. Little did he imagine that soon he would embark on a career in government that would stretch from the 1920s into the 1970s.

After graduating from high school, McKinnon worked for a painting and decorating company in Cumberland until he had saved enough money to attend the University of British Columbia for 1 year in an Arts program. The next summer, 1926, he worked in the Prince George Forest District, assisting various researchers who used the Aleza Lake Experiment Station as a base. A photograph of McKinnon and Eric Garman by a Model T Ford has become a classic in the B.C. Forest Service collection.

McKinnon met Percy Barr at Aleza Lake and was inspired to choose forestry as a career. He entered the School of Forestry at Oregon State University in 1927, the same year Eric Garman graduated. The next summer Fin was attached to the Nehalliston forest survey party to assist Fred Elley in growth and yield studies of lodgepole pine and Engelmann spruce. A photograph in McKinnon's album suggests that he worked for forest surveys in the Powell

River area with Walter McCulloch, who later became dean of Forestry at Oregon State University. After graduating with a BScF in 1929, McKinnon again became Garman's assistant, working on natural regeneration studies in coastal forest types.

Arthur Pickford had been in charge of the Shelbourne Street research nursery in Saanich since its inception in 1927. In 1930, Pickford left Victoria to open the first production nursery at Green Timbers, and McKinnon took over management of the Shelbourne facility for a short time. This nursery was being phased out, so seedbeds were not sown in 1931, and the nursery was abandoned in the spring of 1933. After his short-lived tenure at Shelbourne, McKinnon obtained his MF degree at Harvard University in the spring of 1932.

No record is available of McKinnon's involvement in research projects between 1932 and 1935, but in 1934 he prepared a report, which was not published, entitled "Growing coniferous trees in B.C." This report was based on research conducted previously by Alex Alexander, Eric Garman, Jim Robertson, Stig Schenström, and G.E. Stoodley. It is most likely that the scarcity of research funds precluded the initiation of new research projects and that all research staff were confined to the maintenance of existing projects.

In the fall of 1935, McKinnon won a substantial James Rosenberg scholarship and again undertook post-graduate studies, this time in Forest Economics under Percy Barr at the University of California at Berkeley. The *Forest Branch Newsletter* of June 1936 reported that McKinnon had returned to the Research Division from California, and that he was promoted to the job of assistant to the forester in charge of the Research Division. (That statement is somewhat confusing, since when Barr vacated his position as head of the Research Division in 1932, his position was not filled. Furthermore, most of the research staff [i.e., Pickford, Barnes, Griffith, and Robertson] had departed by 1936, leaving only Garman and McKinnon—the only researchers who remained on staff through the entire Depression.)

The *Forest Branch Newsletter* of May 1937 reported that McKinnon returned to the Research Division after completing his residency at the University of California at Berkeley. In that year, two research foresters were hired—George Allen and Angus MacBean.

Fred Mulholland resigned from the B.C. Forest Branch in January 1939. He had been in charge of the Forest Surveys Division for many years. McKinnon replaced Mulholland, and the Research and Forest Surveys divisions were combined into the Economics Division.

As time passed, the Economics Division became a catch-all that included the Parks, Reforestation, and eventually the Working Plans sections of the B.C. Forest Service. In a re-organization on January 1, 1951, the Economics Division was broken up completely, re-instating the identities of both the Research and Forest Surveys divisions. McKinnon was promoted to forester in charge of the Management Division, Dick Spilsbury was put in charge of Research, and Mickey Pogue headed up Surveys and Inventory.

In 1952, Bob St. Clair retired from his position as assistant chief forester. This job was split into two areas of responsibility, and McKinnon was made assistant chief in charge of Technical Planning. Ed Bassett was put in charge of Administration, which was later renamed Operations.

In April 1959, the office of the chief forester was reorganized. Gerry McKee was named deputy minister and McKinnon became chief forester. In 1965 McKee left the B.C. Forest Service to head the Purchasing Commission and McKinnon became deputy minister.

In 1969, McKinnon also left the B.C. Forest Service, but he did not retire from government. After 1963 he was a part-time member of the Pollution Control Board, so on his retirement from the B.C. Forest Service, he was appointed director of the board. After a short term in office, he relinquished this position to accept an appointment to the Public Utilities Commission. He retired from that position in 1973, 47 years after his first summer job with the B.C. Forest Branch. After 5 years of retirement, he died on November 5, 1978.

Arthur E. Pickford (1880–1965)

Arthur Pickford, circa 1905. (Source: Peggy Goodwill)

The Cowichan Lake Research Station has many attractive landscape features. A favourite of many is a sandy beach that fetches out into the lake near the eastern boundary of the station. It is called Pick's Point and over the decades many visitors have camped or picnicked there. It was named after Arthur Pickford, a researcher who used the locale as a base camp in the mid-1920s when he was studying natural regeneration on many Douglas-fir cutovers on lands bordering Cowichan Lake.

Arthur Pickford was born on June 11, 1880 at Tunbridge Wells, England. Very little information is available about his early life, other than his attendance at Swanlea College, where he studied Horticulture, and a period of employment in horticultural work in France. He immigrated to Canada in 1910. About 5 years later he began working for the B.C. Forest Branch in the Nelson Forest District. He progressed to chief of operations by about 1921.

However, Arthur Pickford was much more interested in the biological aspects of forestry. He got his big opportunity in 1923, when he was hired as a researcher to work out of the Victoria headquarters office.

His research on natural regeneration of Douglas-fir convinced Pickford that artificial reforestation would become a necessity, particularly where fire had occurred on large clearcuts. In 1926 he initiated direct seeding experiments. In 1927, the B.C. Forest Branch recognized the potential need for operational planting projects, and a decision was made to initiate a nursery research program. An experimental nursery was established on a parcel of land on Shelbourne Street in Saanich. Arthur Pickford was placed in charge of the nursery operations and also given responsibility for the research conducted there. In addition to his nursery duties, he continued with his natural regeneration studies.

In 1930, a decision was made to develop a large nursery at Green Timbers, south of New Westminster. Although Arthur Pickford had been in charge of the Shelbourne Street research nursery for just 3 years, he was the only experienced nurseryman available, so he was put in charge of the Green Timbers nursery. Development progressed at a relatively slow rate until 1935, when the Young Men's Forestry Training Plan became a reality, and a large camp was established there.

This work relief program provided a supply of manpower for expanding the nursery, constructing buildings, and developing a reliable water supply. Pickford's job changed almost overnight. Responsibilities for supervising personnel and for camp management took up most of his time, so he was no longer able to concentrate on the biological problems in the nursery. This major shift may have been responsible for Pickford's transfer back to Victoria.

In any case, he spent the next 2 years doing clerical work.

Pickford had maintained a strong interest in anthropology since he was a boy, and over the years, it developed into a hobby. He spent much of his spare time searching for First Nations artifacts, accumulating and cataloguing several thousand. In 1938 he was able to turn this hobby into a career when he resigned from the B.C. Forest Branch to become the curator of anthropology at the Provincial Museum in Victoria.

Pickford retired in 1945 and enjoyed 20 years of retirement before his death in November 1965.

Cliff Riley, circa 1960. (Source: Dave Riley)

Clifford G. Riley (1899–1989)

Cliff Riley's career included research activities in British Columbia and Ontario, and on the prairies, as well as service in both world wars. He was born on March 4, 1899 in West Toronto and died October 15, 1989.

Riley graduated from the Ontario Agricultural College at the University of Guelph with a BSc in Agriculture in 1923 and from Yale University with an MF in 1928. It was there that he met Percy Barr, who was studying for his PhD. In 1927, Barr was appointed to take charge of the newly established Research Division of the B.C. Forest Branch. For several years he spent his winters at Yale University and his summers in British Columbia.

Both Barr and Riley had air force service during World War I and this common experience may well have contributed to their friendship. In any event, Barr persuaded Riley to come to British Columbia and take on the job of superintendent of the Cowichan Lake Research Station, which was scheduled to open in 1929. Riley was hired by the Research Division in June 1928 and so he and his bride headed west. The newlyweds spent their honeymoon in a tent at Pick's Point on the shore of Cowichan Lake.

During his first summer, Riley investigated aphid damage on immature Douglas-fir on Vancouver Island and prepared plans for construction and survey work at the Cowichan Lake Research Station. During the field seasons of 1929 and 1930, Riley spent all of his time there, surveying and mapping the topography and the forest types on the station, and supervising the construction of the buildings and several miles of trails.

In September 1930, an opportunity arose for a position as a forest pathologist with the Dominion government, and Riley left the B.C. Forest Branch to take up residence in Ottawa. He took a leave of absence from that position from 1943 to 1945 to become a training officer in the Canadian army, where he attained the rank of captain.

In 1946 Riley earned his PhD from the University of Toronto, specializing in Forest Pathology. Two years later he transferred to Saskatoon, to establish a regional laboratory of forest pathology to serve the needs of Saskatchewan and Manitoba. Under his charge, this laboratory expanded to seven research officer positions. When he retired in 1964, he and his wife moved to Orillia, Ontario, where he spent much of his time outdoors, hunting and camping, usually paddling his birchbark canoe.

In 1979, Riley and his wife attended the ceremony at the Cowichan Lake Research Station that commemorated 50 years of operation.

(Riley's son Dave, of Kingston, Ontario kindly supplied much of the information for this biographical sketch.)

Jim Robertson, circa 1945.
(Source: Jim Robertson)

James C.H. Robertson (1896– ?)

James Robertson was born at Loch Gilphead, Scotland, on June 7, 1896. He graduated from high school in 1914, where his father was the headmaster, and joined the British army in August of that year. He first saw action in Belgium as a sapper in the Royal Engineers. After taking officer training, he was transferred from the Royal Engineers to the Field Artillery. Robertson was wounded several times, but he recuperated rapidly and managed to survive the war in good physical shape.

After returning to his home in rural Scotland 2 years after the war, Robertson had his first attack of wanderlust. In 1921 he decided to go to North America, visit some war buddies, and explore different parts of Canada and the United States.

He eventually decided to take university training in Vancouver. After brief attendance at the University of British Columbia, he and a group of other war veterans entered the University of Washington to study Forestry.

Robertson graduated in 1927, worked for 1 year in a pulp mill at Shelton, Washington, and then headed for British Columbia. In Victoria he was offered a job in the newly established Research Division. He accepted the position and spent most of his time re-measuring growth and yield plots.

A year later he again succumbed to wanderlust, accepting a job with the Queensland Forest Service in Australia. Two years later he headed back to Canada and rejoined the Research Division. In 1932 he again left British Columbia, this time to attend the University of California at Berkeley to pursue post-graduate studies. After completing his MF degree in 1933, he worked for the U.S. Forest Service for a year and then discovered that he had overstayed his visa. Robertson immediately headed back to Canada and rejoined the Research Division, for the third time in 6 years. He spent much of his time on growth and yield plots and vegetation succession studies on coastal cutblocks.

In 1936, Robertson left the Research Division for the last time to accept a teaching position at Colorado State University. In 1945 he took a more attractive teaching position at the University of Washington, where he became a professor after earning his PhD in Forestry at Duke University in 1947. He spent the rest of his career at the University of Washington and retired in 1969.

For the first two decades of his retirement, Robertson and his wife travelled extensively throughout the world on freighters and cruise ships. During his last years, in La Jolla, California, Robertson looked back with satisfaction on a rewarding career—and with no regrets that, as a young man, he did not hesitate to pull up his roots many times to face new challenges and opportunities.

(*Robertson's son Lawrie prepared a biography of his father's life, and kindly forwarded a copy for use in preparing this report. It was used as the primary source of information for this biographical sketch.*)

Robert C. St. Clair (1886–1966)

Robert Coats St. Clair was born on August 18, 1886 at Pierre, South Dakota, the son of a circuit rider preacher. St. Clair never worked in research, but his actions were important to the development of the Research Branch.

St. Clair's professional career started in 1909, when he earned his BSc in Civil Engineering at the University of Idaho. He followed that with an MF in 1912 at the University of Michigan.

During the summers of his university years, St. Clair worked in timber cruising and fire protection in Idaho and Montana. After receiving his Masters degree, he joined the U.S. Forest Service and spent the summer surveying in the Kootenai National Forest in Montana. In October 1912 he was offered a more lucrative position by the Forestry Branch of the Canadian Pacific Railway, which he immediately accepted, and returned to Canada. He worked for more than 3 years in that position, in charge of timber cruising and survey parties in the Bull River area in southeastern British Columbia. He also assisted companies that logged the railway's timber, by designing flumes and splash dams. In 1916 he left the Canadian Pacific Railway to work for the Dominion Forestry Branch in its Calgary office.

St. Clair joined the B.C. Forest Branch in 1918 as a forest guard in the Vancouver Forest District. In 1921 he was promoted to a position in Victoria, in charge of the Timber Management Division.

In 1923, he wrote a four-page article in *Root and Branch*, the B.C. Forest Branch newsletter, stressing the need for a strong research program headquartered in Victoria. In that article he also recommended that the actions of the U.S. Forest Service be emulated by establishing forest experimental stations in each of the principal forest regions.

As a beginning, St. Clair recommended the establishment of two stations: one on the South Coast, and the other in the Northern Interior along the Grand Trunk Railway line. Apparently his voice was heard. A year later, in 1924, the first experimental station was established at Aleza Lake in spruce–balsam forest types of the Central Interior. Five years later, a second station was established at Cowichan Lake, representative of coastal Douglas-fir forests.

St. Clair could claim another distinction. He was the only staff member who held the position of assistant chief forester for two, or perhaps three, separate terms. The following quote is from the *Forest Service Newsletter* of February 1952, in an article commemorating his retirement:

> *During 1923 Bob St. Clair was appointed Assistant Chief Forester for the first time. In 1925 he was transferred to Nelson as District Forester in order to reorganize the work of the old Southern District but by the following year was back in Victoria as Assistant Chief where he stayed until April 1927 when he became District Forester, Vancouver. On November 1, 1946 Bob became Assistant Chief Forester for the second and last time.*

From this quotation, it might be interpreted that he held the position of assistant chief forester during three separate terms: from 1923 to 1925, from 1926 to 1927, and from 1946 to 1952.

St. Clair's 1927 transfer to Vancouver was evidently a promotion, because in the 1920s, the district forester position in Vancouver was rated as senior to the assistant chief forester in Victoria. In 1938 he was again transferred, this time to Prince Rupert, where he was district forester until April 1945. Then it is likely that St. Clair became acting assistant chief forester in Victoria, replacing C.C. Ternan, until officially appointed to the position in November 1946.

When he retired in 1952, St. Clair and his wife moved to Vancouver, where he joined T.H. Wilkinson to form R.C. St. Clair and Associates, a forestry consulting business. He died on January 12, 1966 in North Vancouver.

Herbert R. (Ray) Sansom (1894–1949)

Ray Sansom was caught up in the excitement and enthusiasm that characterized the development of the Aleza Lake Experiment Station in the late 1920s. He was hired as station foreman in 1927. In accepting the job, he took on the responsibility for the operation of all camp functions. However, the most challenging and satisfying part of his job was his role in the development of a sustained-yield demonstration forest. In that capacity, Sansom became responsible for the control of logging operations and establishment of a variety of post-logging experimental site treatments at the demonstration level.

Sansom brought more than 10 years of practical forestry experience to the job. His forefathers, United Empire Loyalists from the United States, had settled in rural New Brunswick, where he was born on May 4, 1894, in Stanley. His father was in the logging business and owned several sawmills. As teenagers, Sansom and his brothers worked in the woods and sawmills.

In 1914, Sansom joined the Canadian Army and went overseas with the first Canadian contingent in World War I. Back home, his family moved to Edmonton in 1915, so when he was demobilized in 1919, Sansom also headed west. In 1920 he accompanied his father and two brothers to British Columbia, where they worked for several years at various logging and sawmilling operations east of Prince George, between Longworth and Giscome.

Sansom got his first job with the B.C. Forest Branch in 1924, as a patrolman for the summer. In the fall and winter he was hired as a compassman on the McGregor River forest survey under Party Chief Ken Carlisle. Dog teams and sleds were used to transport supplies and gear.

In 1925, Sansom became assistant ranger for the Aleza Lake Ranger District. At that time there were few roads, and the primary mode of transport to logging and sawmilling operations was the railway, using a jigger (i.e., a small manual or powered railway car) or a three-wheeled type of bicycle called a velocipede. On one occasion, Sansom met a rapidly approaching snowplow on a trestle and both he and the jigger were thrown into the snow-covered creekbed below.

Meanwhile, considerable activity had taken place at the nearby Aleza Lake Experiment Station, which was established in 1924. A road had been constructed, several buildings erected, and a variety of research projects initiated. The overall objectives were to demonstrate sustained yield, convert the old-growth forest to a true selection forest, and provide a base for research on management and silvicultural problems of spruce–balsam forest types.

The management plan called for an annual harvest of approximately 4530 m^3. By 1926 a forest inventory had been completed, and the stage was set for the first logging. During the winter of 1926–1927, 4830 m^3 were logged on an area of 32 ha. Problems encountered during this first year pointed to the need for a resident supervisor with considerable practical experience in the woods and full knowledge of forest regulations.

Sansom was best suited for the job, with his many years of practical experience in the woods and sawmills of New Brunswick and in the Upper Fraser area of British Columbia, as well as 3 years as an assistant ranger. He was hired by the Research Division as "foreman and ranger," and with his wife and baby, he moved to the station in 1927, taking up residence in a small log cabin.

In addition to a variety of foreman's duties at the Aleza Lake Experiment Station and on active logging operations, Sansom was responsible for conducting an experiment to test five methods of brush disposal on logged areas.

These treatments included piling and burning during active logging, piling during logging but burning later, piling but no burning, lopping and scattering, and lopping only.

Unfortunately, it soon became impossible to follow the timber harvesting schedule. The local sawmill ceased operations, and only 906 m^3 were logged on an area of 5 ha in the winter of 1927–1928, and no logging was done at all in 1928–1929. Logging resumed in 1929–1930, but weakened market conditions brought on by the Depression limited the cut to 453 m^3 and caused the complete abandonment of the plan to demonstrate sustained yield.

In the spring of 1930, Sansom and his family moved to Victoria, where he divided his time between the Research Division office and activities at the Cowichan Lake Research Station, Green Timbers Forestry Station, and the Shelbourne Street research nursery. In the late summer he and his family moved back to Aleza Lake, where Sansom was occupied with road and trail improvement as well as assisting with the measurement of various research plots.

In March 1931 Sansom left the Research Division to take on ranger duties at McBride, where he stayed for 14 years. In McBride he became active in community affairs, holding the office of president of the Canadian Legion for several years and that of exalted ruler of his Elks Lodge. During World War II he was in charge of the local Pacific Coast Militia Rangers unit. To his friends in McBride and in B.C. Forest Branch circles, Sansom was noted for his good sense of humour, as a teller of tall tales, and as a skilful cribbage and poker player.

In 1941 he experienced a second, but much more serious railway accident, when his gas-powered speeder was derailed. He was hospitalized for a long time, and never fully recovered from his injuries. Ill health eventually forced him to retire, on February 1, 1945, and he moved to Jasper, Alberta in May of that year to manage a pool hall that he and his brother had purchased. He died in March 1949.

Stig Schenström, Braham Griffith, E.H. Finlayson, and Jim Curtis at the Cowichan Lake Research Station, 1929. (Source: Research Branch)

Stig R. Schenström (1900–1980)

Stig Robertsson Schenström was born in Stockholm, Sweden on April 27, 1900. He finished his public schooling at the end of World War I, but for the next 10 years he had difficulty in finding steady employment. Initially, he obtained a job in an ironworks factory. In 1922 he took some technical forestry training in Stockholm, and he worked on many short-term thinning and forest inventory jobs before entering the Royal College of Forestry in Stockholm, from which he graduated in 1927.

Schenström's search for a job was interrupted in 1928 when his cousin's daughter from Canada visited Sweden. Her father, Gotfrid Björnsfelt, was a successful physiotherapist in Victoria. After the visit, Schenström corresponded with Björnsfelt, seeking information about employment opportunities for foresters in British Columbia. His cousin's optimism gave Schenström sufficient reason to leave Sweden for Victoria. His fluency in English was a big advantage.

Schenström left Sweden in November 1928 and started working for the Research Division on April 1, 1929. Most of his work was on thinning and pruning projects in young Douglas-fir forests at the newly established Cowichan Lake Research Station. The Research Division was expanding in both staff and programs, so Schenström soon became convinced that he had a steady job in very promising circumstances. In his optimism he sent word

to his fiancée in Sweden to join him, and they were married in Victoria in December 1930.

The Depression deepened in 1931 and a major reduction in the Research Division's budget resulted in Schenström being laid off in November of that year. He was the first employee to go, since he was neither a Canadian citizen nor a British subject. Schenström tried desperately to find another job in British Columbia, and landed a 4-month stint with the Dominion Forest Service. He then got another short-term job, establishing hemlock thinning plots for the B.C. Pulp Company at Quatsino Sound. After that, and following a prolonged search for work, he was finally employed as an assistant lighthouse keeper on Mayne Island. He then applied for and was awarded the Anderson Research Fellowship at the University of Washington. When that finished in 1935, he could find no work, so he and his wife returned to Sweden.

The employment picture in Sweden was no better, but Schenström was fortunate to obtain a job offer from a Swedish match company, Svenska Tändsticks AB, to work on their forest holdings in Argentina. Little is known about his activities in South America over the next 40 years. Schenström became depressed while he was unemployed in British Columbia and stopped corresponding with most of his relatives. In 1975, Schenström and his wife returned to Sweden, where they spent the last years of their lives. Schenström died on February 17, 1980.

Although he worked for the B.C. Forest Branch for less than 3 years, Schenström is one of the most well-remembered researchers who worked for the Research Division in the early days. The reason is that he left his mark on the forests of the Cowichan Lake Research Station, where the Schenström Douglas-fir thinning plots are often shown to visiting foresters and others taking guided tours.

These plots, which were the very first thinnings in coastal British Columbia, have been well-maintained. There have been several additional thinnings plus many re-measurements over the past 75 years or so and the data collected have been incorporated into growth and yield models. The coarse woody debris, or large fallen logs on the forest floor, were accurately mapped by Schenström and his colleagues in 1929—something unique to that time period because coarse woody debris was then generally of no interest. Re-measurement of that material in the mid-1990s enabled the calculation of long-term log decay rates in a real-world environment.

(Stuie Lithzenius of Solma, Sweden is the source of much of the information in this biographical sketch. As a genealogist and distant relative of Stig Schenström, he was able to supply information that was not available elsewhere.)

Cedric Walker, circa 1970. (Source: Cedric Walker)

Cedric W. Walker (1907–2003)

In relation to the rest of a very long forestry career, Cedric Walker's involvement with forest research was minor. He worked for only 4 months at the Aleza Lake Experiment Station, but this brief experience is of importance to our understanding of early research history.

Walker, in his late 80s when this biographical sketch was done, was one of those fortunate individuals endowed with a good memory. He also had an excellent set of photographs from the summer of 1925—although the Aleza Lake Experiment Station had been officially established in 1924, the development of the campsite did not commence until the next year. Walker's memories of the people and the events of that summer help to trace

the inception of research activities in the Central Interior of the province.

Walker's memories also provided information about the early days of the B.C. Forest Branch. He remembered Martin Grainger, who became chief forester in 1915, succeeding H.R. MacMillan. Grainger achieved this senior position despite the fact that he had never attended a forestry lecture. Walker attributed his selection of forestry as a career to the influence of Grainger, who was a close friend of the Walker family for many years.

Walker was born in London, England on August 26, 1907. A year later his family moved to Victoria, where his father, a doctor, had accepted a position at the William Head Quarantine Station. Walker matriculated from Brentwood College in 1924 and entered the College of Forestry at the University of Washington that fall. During his first year at university, Walker decided to look for a summer job in the woods. He had heard that the B.C. Forest Branch was interested in hiring forestry students:

My application for a job was accepted by the Forest Service, and I was instructed to proceed by rail to Aleza Lake, and keep a careful account of my expenses en route. I traveled by CNR from Vancouver. This route entailed switching trains at Red Pass Junction. After disembarking at this station, I decided to stop over at Jasper and enjoy the mountain scenery that I had heard so much about, and catch the westbound train the next day.

So I hired a limousine and headed for Jasper Park Lodge. I rented one of their rustic log cabins, ate a fine dinner, and then canoed on Lake Beauvert with a girlfriend who was working at the lodge for the summer. The next day I caught the train to Aleza Lake, and upon arrival presented an account of my expenses to Percy Barr, who was in charge of the experimental station. When Percy saw the expenses incurred at Jasper (around $15) he whistled in disbelief and told me that not even the chief forester was allowed to live in such luxury at public expense. Without quibbling any further he submitted the voucher to Victoria, but in the end I had to absorb half the cost.

Development of the Aleza Lake camp was at a very early stage when Walker arrived. A right-of-way had been cleared for a wagon road extending from the railway to the campsite. Building materials and camp supplies were transported by horse and wagon. Tents for a kitchen and for accommodation were erected on wooden frames, complete with wooden floors and walls.

The primary objectives of the Aleza Lake Experiment Station were to demonstrate sustained-yield forestry on a practical scale and conduct research into silvicultural problems attending the conversion of old-growth forests. Consequently, in 1925, the first priority was to obtain a forest inventory upon which to base the calculation of sustained yield capacity. The inventory crew consisted of two experienced timber cruisers, Ken McCannell and Eric Garman, who had previously worked on forest surveys. Walker and another student, John Dawson, were the compassmen.

Percy Barr was in charge of all activities at the station. Land clearing and building site preparation were done by a local resident, John Gerlitzky, using a team of horses. The cook was Jack Freeborn. Of this time, Walker said:

I thoroughly enjoyed my summer at Aleza Lake, although the mosquitoes and flies were more than an irritation on some days. The morale of the crew was exceptionally high. We felt that we were a part of something new in B.C. forestry.

We had no difficulty in finding something to do in our spare time. I had brought

a portable, hand-wound phonograph, plus a dozen records of modern music such as "Alexander's Ragtime Band" and "Take Me Out to the Ball Game." After we made the acquaintance of several girls living in Aleza Lake village, they would be invited to come to the camp on a Sunday to enjoy the music. Social events were infrequent, so they did not complain about having to travel three miles by rail and then walking another three-quarters of a mile on a foot trail that was sometimes quite muddy.

Another expression of the high morale which prevailed was a joint project which we pursued after hours, on our own time. Out of one huge spruce log we made a set of furniture using an axe and a crosscut saw. We made chairs, a table and a sofa.

Percy Barr could probably take much of the credit for keeping the crew happy. I remember cruising timber on a hot day in early August, nearly a mile from the camp. It was mid-afternoon and we were exhausted, having been without water since early morning. Suddenly Percy Barr appeared from behind a big spruce tree with a jug of lemonade. He had calculated our probable location and had navigated successfully.

During his second year at university, Walker again applied to the B.C. Forest Branch for a summer job. Unbeknownst to him, his application was confused with another Walker who had worked for the branch in 1925, but who had received a poor recommendation. By the time identities were straightened out, there were no openings in Research, so Cedric Walker was offered a job in the Forest Surveys Division.

He accepted the offer and worked on forest survey field projects every summer until the end of the 1928 field season. As a brand-new Forestry graduate, Walker sought other challenges and experienced a brief but exciting career as a stockbroker, which ended abruptly with the stock market crash of 1929. But even that did not dampen Walker's spirit:

When my job disappeared, I was living at my parents' home in Victoria. I took stock of the situation, bought a set of golf clubs for $50, and a brand new Model A Ford roadster for $746. When I wasn't looking for a job, I could be found at the Victoria Golf Club, which I joined for $25.

With his past record of performance, Walker did not have to look very long for a job. In May of 1930 he resumed field work with the Forest Surveys Division. In 1931 he became a party chief, working in many parts of the province for the next 6 years. In 1937 he transferred to the management section of the Kamloops Forest District and remained there until he joined the Royal Canadian Air Force in 1941. During the next 4 years he taught navigation to air crew trainees and spent a short time as a personnel counsellor before being discharged.

His first post-war job was as a stumpage appraisal officer in the Vancouver Forest District. In late 1945, Walker left the B.C. Forest Service to become a consultant for C.D. Schultz and Company. For the next 29 years he stayed in the consultant business, working for several companies, mostly in an executive capacity. His work took him to many parts of Canada and the U.S., as well as to 12 other countries. When he retired in 1974, he took on the job of registrar of the Association of B.C. Forest Professionals, which he handled until 1979. He lived in a home on Salt Spring Island, which he designed himself, and died on November 24, 2003, aged 96.

M.B. (Bruce) Clark (1923–)

Bruce Clark was born in Liverpool, Nova Scotia on October 4, 1923. His family soon moved to a small farm near Windsor, Nova Scotia, where Bruce attended school, graduating from high school in 1942. In September of that year, Clark joined the Royal Canadian Navy, was trained in eastern Canada, and went to sea in the spring of 1943. He served aboard escort ships on North Atlantic convoy duty until the war ended in 1945.

Clark was discharged from the navy in mid-September 1945. It was too late for him to enrol at university, but he was able to get a job with a small sawmill company. Clark recalls how that experience helped him make up his mind about a career:

> *I was hired for the princely sum of $40 per month plus room and board. For the next 10 months I kept the books for the company, handled shipping of all lumber, and, when necessary, worked in the sawmill as tallyman-trimmer. As a youngster I had enjoyed wandering in the woods near our farm. It had always been in the back of my mind to study forestry. The time spent working at this sawmill helped me to solidify plans.*

Clark soon discovered that the University of New Brunswick Forestry classes were overloaded, so he headed west and registered in the Department of Forestry at the University of British Columbia in the fall of 1946.

While he was attending university, Clark spent the summers working for the Research Section of the B.C. Forest Service Economics Division, establishing and re-measuring growth and yield plots in many parts of the province. This experience helped him obtain a permanent position with the Research Division when he graduated in 1950.

Four years later, when he accepted the job of regional research officer in the Kamloops Forest District in 1954, Clark took on the responsibility of breaking a lot of new ground. The critical elements of this challenge were to establish meaningful communication linkages with personnel in the forest district and develop a 5-year research plan. Up until that point, no researchers had been posted at any district headquarters. As a result, there was only limited communication between the Research Division and district personnel. A comprehensive provincial research program would never become a reality unless information flowed freely between these sectors of the B.C. Forest Service.

As the years went by, regional research officers were posted to other districts. In general there was high staff turnover in the position, but Clark was the outstanding exception: he occupied the position in Kamloops until his retirement in 1984.

Clark retraces his duties from early in his career:

Initially I was responsible for all growth and yield plot establishment and remeasurement and I also carried out special mensurational studies under Al Fraser's direction. My duties changed dramatically in 1954 when I became the first researcher to occupy the position of regional research officer. Much of my time would be spent communicating with people rather than measuring trees or crunching numbers. I became actively involved with silvicultural problems, especially those associated with regeneration.

After establishing a variety of test plantations, I assisted district staff in establishing the first operational plantation, as well as major direct seeding projects after large wildfires. I also spent considerable time and effort collaborating with range experts on research projects aimed at maximizing the joint production of beef and wood after clearcutting.

The Kamloops research staff expanded during the 1970s. Clark recalls the changes:

It was rewarding to witness the progress over the years. I started in 1954 as the lone researcher in a rented office with one or two summer assistants. When I retired, the professional staff had increased to nine individuals and there were many technicians and summer assistants. Over the years I had established good rapport with the field staff of both the B.C. Forest Service and the forest industry, and had collaborated with federal researchers on a variety of projects.

Clark's contribution to reforestation activities in the Kamloops Forest Region was formally recognized in 1988, 4 years after his retirement. He was invited to assist the Minister of Forests in planting the 200 millionth British Columbia seedling—which was planted in the Kamloops Forest Region—in recognition of Clark's involvement with establishing the first plantations in the region.

Since his retirement, Clark has expanded his community and sports activities to the point where he has little time to spare. He began by helping his wife, who as a volunteer delivers for the Meals on Wheels program. He then developed an interest and expertise in lawn bowling, eventually becoming a director of the B.C. Lawn Bowling Association, as well as an official coach. He also participated in and volunteered for the B.C. Summer Games, and was a member of the Seniors Games Sports Advisory Committee.

His participation in community activities did not go unrecognized. To quote Clark:

In October 1993 I felt very humble, but proud, to stand beside 75 other citizens and be the recipient of a Centennial Medal presented by the City of Kamloops "in recognition and appreciation of meaningful contributions to the City of Kamloops."

Alan R. Fraser (1919–2000)

Alan Fraser was born on March 15, 1919 in Halifax, Nova Scotia. Before he reached school age, his family moved to British Columbia, where they took up residence in West Vancouver.

Fraser chose Forestry as a career while he was still in his teens. His mother encouraged him by making him aware of potential job opportunities in "our primary industry," but the major factor in his career choice was the time he spent in the forests on the North Shore of Burrard Inlet. The family owned a cabin on Hollyburn Mountain and Fraser spent much of his spare time there—hiking in the summer and skiing in the winter. During his late teens his explorations covered a much wider territory and he became familiar with logging and milling operations over a large area.

Fraser's first experience with the B.C. Forest Branch was in the summer of 1937, when he worked in the Young Men's Forestry Training Plan. He spent the first few weeks of the summer at the Aleza Lake Experiment Station, which served as a clearing centre. Enrolees were received at the station, evaluated, and then assigned to a crew with specific duties. Fraser spent the rest of the summer in a 10-man crew constructing trails east of McBride.

While he was studying at the University of British Columbia, Fraser spent two more summers working for the B.C. Forest Branch. In 1940 he was a compassman on the North Shore forest survey party and in 1941 on the Fraser South survey. Mickey Pogue was the party chief during both years.

The year 1942 was a landmark in Fraser's life. He graduated in Forest Engineering, married Elaine Kissick, and joined the Corps of Royal Canadian Engineers. As a lieutenant, he spent 2 years in the Italian campaign, was wounded twice, and lost a leg below the knee.

On his discharge from the army, Fraser joined the B.C. Forest Service in January 1946 to work as a researcher in the Economics Division. He started his research career as an assistant to Alex Alexander, who was in charge of growth and yield research. For the first few summers, Fraser spent much of his time in the field, but problems with his artificial leg worsened and it became impossible to continue with lengthy periods of field work.

After Alexander's death in 1951, Fraser was given more responsibility. To expand his expertise, he launched a self-study program in Biometrics, with occasional advice from professors at the University of Victoria. In 1953 he attended a 3-month course in Biometrics given by the U.S. Forest Service in Washington, D.C. As he became more proficient, he took on the duties of a technical advisor to research staff as well as to members of other sections of the B.C. Forest Service.

Fraser developed considerable expertise in mensuration, design and analysis of surveys and experiments, and "number crunching" procedures. But when he was asked for his technical advice he sometimes encountered views that were diametrically opposite to his own. Using considerable tact, he was able to put across his message without generating ill feelings, and all of the researchers relied heavily upon Fraser's help in planning and analyzing their research.

However, a large portion of his time was also devoted to problem-solving outside of the Research Division. For example, from the *Forest Service Newsletter* of December 1956, we know that:

During the early fall, Alan Fraser conducted a course in timber-sale cruising. The purpose was to streamline timber sale procedures in line with modern statistical

methods, to produce cruises to specific standards of accuracy. Earlier, Alan invaded the scaling section of the Vancouver District Office with a new and simplified procedure resulting in a saving of 30 percent in time for computing log-scale.

During the 1950s, Fraser contributed substantially to the Surveys and Inventory Division of the B.C. Forest Service. The forest inventory methodology underwent a major overhaul and the various section heads in that division consulted frequently with him in developing a brand-new system.

Fraser's talents became widely known throughout the B.C. Forest Service and, had he wished, he might have advanced to a higher position or taken any one of several offers made to him from outside of government. Instead, he preferred to remain in the Research Division. For him it was sufficiently challenging and rewarding to apply his knowledge to a great variety of B.C. Forest Service problem-solving needs.

Fraser left the B.C. Forest Service in 1979 and, despite some persistent health problems, enjoyed the "pleasantries of retirement" until his death on February 10, 2000.

Alan L. Orr-Ewing (1915–1995)

Among the scores of researchers who have worked for the B.C. Forest Service over the decades, only a handful of individuals has had a major, long-term impact on the Research Program. Alan Orr-Ewing was one of them. Early in his career he took an interest in forest genetics and dedicated himself to initiate research in this field, despite the lack of both funds and interest on the part of the B.C. Forest Service. Orr-Ewing could take a great deal of credit for a program that now extends to many species in most parts of the province.

Although Scotland was his homeland, Orr-Ewing was born in London, England on January 13, 1915. His mother had taken up short-term residence in London in order to be near her soldier husband, who was convalescing in a London hospital after being wounded in France. When he was only a few weeks old, Orr-Ewing and his mother went north to the family home near Stirling, Scotland.

Orr-Ewing became very involved in sports at an early age. One of his favourite activities was boxing, at which he excelled, and he won several competitions during his twenties while he was at university.

When he matriculated from private school in 1933, Orr-Ewing decided that he would like to take training in Agriculture, but a search of learning institutions in Great Britain failed to locate an appropriate school. As his search widened, the most promising school appeared to be the Ontario Agricultural College at the University of Guelph, so that is where Orr-Ewing headed.

The curriculum included an introductory Forestry course and it awakened Orr-Ewing's interest in British Columbia's forests. After receiving his diploma in Agriculture in 1935, Orr-Ewing bought a 1928 Chevrolet and drove to British Columbia to look for employment in forestry.

Through a distant relative in Victoria, Orr-Ewing made contact with someone in the B.C. Forest Branch, and learned that the best job opportunities in forestry were through the Young Men's Forestry Training Plan. He also discovered that he was not eligible, since he was not a British Columbia resident. He was informed that the B.C. Forest Branch would gladly hire him and pay his room and board, but that there was no money for wages. Orr-Ewing accepted the offer and was hired by the Research Division to work as

a field assistant to Jim Robertson. Orr-Ewing's first day of work is recorded by his signature in the Cowichan Lake Research Station's visitors' book on May 14, 1935.

When he was laid off from this job in September 1935, Orr-Ewing worked as a logger for several months. His first job in the forest industry was for $3 a day at the Campbell River Timber Company. He worked on the track crew, laying steel for new railroads and dismantling abandoned railway grades. This job soon ran out, but Orr-Ewing quickly got a job with Alberni Pacific at Camp Five near Port Alberni. Following another layoff, Orr-Ewing went to work for Bloedel, Stewart and Welch near Campbell River.

In May 1936, Orr-Ewing was hired by the Research Division. He was paid $90 a month and worked as a field assistant—sometimes for Eric Garman and sometimes for Cy Oldham. Orr-Ewing travelled extensively throughout the Vancouver Forest District that summer and, in the course of it, made the decision to pursue Forestry as a career.

After researching the Canadian Forestry schools, Orr-Ewing returned to Scotland and attended the University of Edinburgh, from which he graduated with a BSc in Forestry in 1939. War was declared a few months later, so he immediately joined the army and was sent to France in January 1940, as a second lieutenant. After receiving the Military Cross in action, he was captured in the spring of 1940. Orr-Ewing spent the next 5 years in prisoner-of-war camps, investing much of his time in escaping or preparing to escape. He managed several escapes, but was caught each time.

After the war, Orr-Ewing and his fiancée Helen were married in Toronto in 1945. They took up residence in Inverness, Scotland, where he was employed by the Forestry Commission as a district forest officer. But job advancement was very limited, so Orr-Ewing decided to return to British Columbia and look for employment opportunities. When he arrived in Victoria in February 1948, Orr-Ewing was hired by the Research Section of the Economics Division. He began his research career with studies on natural regeneration of Douglas-fir after clearcutting, in which he concentrated on seed predation by small mammals.

In 1950 Orr-Ewing decided to specialize in forest genetics. He obtained his Masters degree in Forestry at the University of California at Berkeley in 1951, and then continued with post-graduate studies at the University of British Columbia. In 1953, as a result of his efforts, tree improvement research was formally recognized by the B.C. Forest Service.

In 1956, Orr-Ewing became the first recipient of a PhD from the Faculty of Forestry at the University of British Columbia.

Despite limited funding for the Research Division during the next two decades, Orr-Ewing managed to expand research efforts in tree improvement. He was largely responsible for organizing the Plus Tree Board in 1959 that brought industry and government together to encourage tree improvement work. This culminated in an expanded program involving the establishment of clone banks and seed orchards on a large scale.

Orr-Ewing gained considerable recognition for his contribution to tree breeding in British Columbia. One of the most prestigious awards came in 1971, when he became the first recipient of the Distinguished Forester Award from the Association of B.C. Forest Professionals.

By the time Orr-Ewing retired in 1979, he had witnessed the expansion of the Tree Improvement Program on a grand scale throughout much of the province.

He enjoyed more than 10 years of retirement until his health began to fail. He died on February 26, 1995.

E.A. Roberts (1911–2005)

In many instances, the unsung heroes of the Research Division were the non-professional support staff. They served in many capacities, either by direct involvement in a given research project, or by troubleshooting to ensure that a research project could proceed smoothly. Ed Roberts was in the latter category. He spent his entire career at the Cowichan Lake Research Station and during most of that time he helped many researchers in the pursuit of their work.

Roberts was born in Victoria on February 15, 1911. He attended schools in both Victoria and Metchosin. As a teenager, he spent a great deal of his time outdoors, on the family farm or working at small jobs in the local woods.

Earning a living during the Depression was a major challenge for most people and finding continuous employment on one job was almost impossible. Like so many others, Roberts worked on a great variety of jobs, but it was on the forestry-related jobs that he gained the experience that proved most useful to his future. He was able to divide his work between the B.C. Forest Branch and the logging industry, working during the winters on a range of jobs (e.g., chokerman, spark chaser, loader, and blacksmith) for logging companies in the Sooke and Jordan River areas. During the summers, he worked for the B.C. Forest Branch either as a lookout or on fire patrol in the Sooke area.

Roberts got his introduction to the Cowichan Lake Research Station, and an opportunity for continuous employment, during World War II. In 1942, the provincial government voiced concerns over the possibility of "incendiary airborne missiles" starting fires in the forests of British Columbia and the lack of available manpower to deal with this situation. The federal government responded by making several hundred alternative service workers available to form fire-fighting crews. Most of these workers spent a good deal of time on reforestation projects. Roberts' first job at the Cowichan Lake Research Station, in October 1942, was to supervise an alternative service worker crew that was converting abandoned logging railway grades to truck roads to provide access for reforestation crews.

In the spring of 1943, Roberts was put in charge of camp operations at the Cowichan Lake Research Station. He was also responsible for timekeeping, running a commissary, and delivering nursery stock to planting crews. By today's standards the camp was very primitive, so Roberts' duties included a significant troubleshooting component. The telephone system was an underwater line across Cowichan Lake. The heating system in the bunkhouses consisted of 45-gallon oil drums converted into stoves. Combined with a huge wood-fired cookstove, there was an endless demand for vast quantities of firewood. The camp had no electricity, no refrigeration, and no flush toilets.

Many changes occurred during the 1950s and 1960s, and Roberts participated in them:

The camp had inadequate sleeping and eating facilities until the late 1950s. Bunkhouses had canvas-covered roofs, shiplap floors and walls. Shingles had been applied in the late 1930s, but the outside was still visible from the inside through

open knot holes and cracks, and you could, had you wanted to, throw golf balls through the walls or floors without much resistance.

Roberts' fire protection responsibilities were especially demanding. During periods of exceptionally high hazard, he was expected to be at the ready 7 days a week.

Research activities at the Cowichan Lake Research Station gradually increased after the war and Roberts' duties expanded to include providing assistance to the researchers. Commercial thinning projects began in the early 1950s under George Warrack's supervision and Roberts helped with equipment maintenance and fire protection. In 1953, Alan Orr-Ewing started the Douglas-fir tree improvement program, and the Cowichan Lake Research Station became the centre for this project. It fell to Roberts to clear and prepare land for demonstration plots, progeny tests, clone banks, and a nursery.

During the 1940s, Roberts and his wife, Margaret, lived in cramped quarters in a small lakeshore house:

We moved into the lakeshore residence in 1943, where there was no bathroom and no insulation, so that in the rainy season, which lasted for about half the year, the walls and floor were constantly damp and often dripping with water. A year later a bathroom was added and a fireplace was built. Rent was $15 a month, which was paid by serving meals to foresters and their helpers in this residence when the cookhouse was not in operation.

To encourage them to remain at the station, the B.C. Forest Service constructed a new house in 1950. The Roberts family lived in their new home until Roberts' retirement in February 1976. They then took up residence in East Sooke, where they were able to enjoy rural life. This country "estate" of forest and field reflected the care and dedication that its owner practised for so many years at Cowichan Lake.

Dick Spilsbury, circa 1968. (Source: Ralph Schmidt)

R.H. (Dick) Spilsbury (1907–1999)

Today in British Columbia, the biogeoclimatic ecological classification system is a well-known and established tool for making site-specific decisions in forestry and in closely allied disciplines. Few people, either in the Research Program or beyond it, are aware that the roots of this program were established more than a half century ago by Dick Spilsbury.

This is his story, as he has written it:

I was born in North Vancouver in 1907 and attended Queen Mary Public School and North Vancouver High School. I then went to UBC at Fairview, starting in the class of Arts '29. I switched to Agriculture after one year and graduated with a BSc in Agriculture in 1929. I returned to UBC in 1934 and obtained a Masters degree in 1936.

During summer holidays I was a flunky in a logging camp, a bellhop in a CPR resort hotel, and an elevator operator in a department store. My introduction to the B.C. Forest Service was in 1926.

At that time the Forest Service was establishing "forest reserves." These were large blocks of timber set aside for management purposes, and it was desirable that they should not include agricultural land that might be withdrawn from a reserve through pre-emption, at some later date.

I was assigned to a land use party, although the term "land use" was unknown then. The party chief was Ray Fisher. There were two soil surveyors, Ken Moffat and Willoughby Mathews, both graduates in Agriculture. There were two chainmen, Ian MacQueen and myself.

Our task was to examine the land lying north of the Grand Trunk Railway (now the CNR) between Fraser Lake and Smithers, establishing the southern boundary of the proposed Babine Forest Reserve.

As a result of this experience, as well as the influence of Willo Mathews, I switched from Arts to Agriculture.

The following year, 1927, I was a compassman under Gerry McKee. This survey extended from the Willow River to the Fraser, south to Stony Creek and north to Chief Lake. While the settled portion of this area was excluded, there was still a boundary to establish between potentially arable and forest land. Again I worked with an Agricultural graduate, Gabriel Luyat (who later became district agriculturist at Williams Lake) while two cruising crews covered the rougher forest land.

As I had no farming experience, the dean of Agriculture decided I should spend one summer on a farm before being allowed to graduate. Consequently, in 1928, I learned to milk cows on Nicomen Island in the Fraser Valley.

In 1929 I again worked for the Forest Service on a survey north of Sicamous Lake and west to Adams River (Momich Forest Reserve). By now, I was the soils man ($90 a month—up from $75). However, there was little potentially arable land, and I was cruising timber most of the time. John Liersch was the party chief with a crew of 10, plus packhorses and two packers. The party (Harold McWilliams, assistant chief, Bill Trenholme, Bob Shaw, and Lyal Trorey, draftsman) lasted from April 1st to snowfall in November. That winter I returned to Victoria and worked on compiling timber cruise data.

In 1930 I left for England, obtaining free railway passage by acting as a guard on a Chinese immigrant train. I arrived back in Montreal on Labour Day, having spent my last $7 on Customs dues. Once home I found work to be very scarce, however the Department of Agriculture was initiating soil surveys of agricultural areas. I was taken on in a complicated deal whereby I was paid from Ottawa but under a provincial boss, C.C. Kelly. Neither of us knew much about soil classification as practised in the U.S., but the intent was that soil surveys in Canada should be compatible with work done in the States. The headquarters was in Kelowna, and for nine years I worked out of this centre. We mapped the soils from Shuswap Lake south to the border, the Fraser Valley, and the Prince George region.

In retrospect, the most interesting and challenging time during those years was in 1938. That year I collaborated with Ed Tisdale from the Dominion Range Experimental Station at Kamloops on an ecological study of soil-plant relationships along an altitudinal transect near Kamloops. A few years later I was to get the opportunity to expand my activities in this direction.

During these nine years my job was anything but secure. In a couple of years, there was insufficient funding for winter employment, and I would be laid off after the field season. I took these opportunities to return to UBC to earn my Masters degree, specializing in Soil Science.

Eleanor and I were married in 1936, and our first daughter arrived in 1938. With these added responsibilities I began seeking a steady job with the opportunity to contribute to a pension plan. In 1939 I was fortunate to have an interview with Fin McKinnon, who had just been promoted to forester with the newly formed Economics Division of the B.C. Forest Service. This division served as a catch-all with Surveys, Air Photos, Research, Reforestation, and Parks all lumped together.

The Campbell River fire of 1938 had burned over many thousands of acres on Vancouver Island. Much of this land had been logged previously, and distances from seed sources were far too great to permit adequate natural regeneration. The B.C. Forest Service decided to launch a large-scale planting program to reforest the area. Since the topography of a substantial part of the area could permit agricultural use, it was imperative that a soil survey precede the reforestation program, so that potential agricultural lands would be excluded.

I was offered the job of conducting a land use survey for these purposes. I immediately accepted, and moved to Victoria in December 1939. I was a part of the Forest Surveys Section of the Economics Division. My first assignment was a soil survey of eastern Vancouver Island from Kelsey Bay south, paying particular attention to proposed planting sites.

By 1944 I had completed the required land use survey, and I was successful in transferring from the Forest Surveys Section to the Research Section of the Economics Division. I joined George Allen, Eric Garman and Angus MacBean in an old house on Michigan Street. My primary research efforts were focused on developing an ecological classification system for second-growth, coastal Douglas-fir forests. In 1947, my assistant Doug Smith and I published the results of this work. Two years later I was able to provide transportation and living expenses for Dr. Vladimir Krajina (from Czechoslovakia), and we collaborated that summer, working in old-growth forests. Over time, Dr. Krajina and his students made major contributions in developing a classification system for the entire province.

As time went by, the Economics Division gradually disintegrated. Parks, Reforestation, and Air Photos became separate entities, until finally, by 1950, only Forest Surveys and Research remained. Ambitious plans were suddenly developed for expanding forest survey work under a federal/provincial agreement, and the Forest Inventory and Working Plans Division was created. This left only a Research group, so the Economics Division disappeared and the Research Division was reborn.

However, there was a major distinction here. All of the other divisions that had been formed out of the Economics Division experienced program expansion. Such was not the case with the Research Division, despite the opportunity to do so under a federal/provincial agreement, and despite a strong recommendation from Chief Justice Sloan that forest research be expanded. Our time had not yet arrived. The B.C. Forest Service was occupied with forest management licences, and in the process, no one identified a viable role for research.

I was promoted to forester in charge of the Research Division. My first recollection of the job was a discussion with Chief Forester Orchard. I wanted to gain an understanding of the official role of the Research Division in relation to the rest of the B.C. Forest Service. From the discussion, I came to realize that there would be no goals set for the Research Division by the B.C. Forest Service. Furthermore, there was no hope of a significant budgetary increase. The Research Division was not going to be a partner with a role to play in forest management.

I worked very hard to get a research forester stationed in each forest district, hoping that the field foresters and the research forester would get together, and by this means there might be feedback to guide us in silvicultural studies required in the different forest types of the province. With few exceptions, we were left without constructive views as to the silvicultural problems. Our greatest support came from company foresters. Toward the end of my term, things began to turn, as more and more emphasis focused on sustained yield and the problems associated with it. Forest management meant more than just administration.

That's probably as much as I care to say about the frustrating part of the job, although I could also discuss perennial scrounging for funds from other divisions.

There were also many enjoyable and rewarding times. We did make gains in shaping a research program in anticipation of future B.C. Forest Service needs. In particular, I am proud of the fact that under my administration we were the first organization in the Pacific Northwest to undertake a genetics program for tree improvement. This program received great support from company foresters.

I also took pleasure and satisfaction in supporting staff researchers to improve their capabilities and their expertise through post-graduate studies.

When I retired in 1971, I did not leave with bitter feelings. I realized that the time had not yet come for research to be recognized and valued by the B.C. Forest Service.

George Warrack, circa 1955. (Source: Research Branch)

George Clark Warrack (1919–)

George Warrack was born in Aberdeen, Scotland on November 1, 1919. Two months later he and his mother travelled to Malaysia, where his father managed a rubber plantation near the village of Sungkai, north of Kuala Lumpur, the present capital of Malaysia. George was cared for by a Chinese amah and fussed over by the employees, especially during Chinese New Year festivities and Muslim holy days.

However, no school was available, so in 1925 Warrack returned to Aberdeen, where his parents still owned a house. It was to be his home for the next 15 years while he attended the Aberdeen Grammar School and the University of Aberdeen. He tells his story:

The housekeeper (and my guardian while my parents were abroad) had been a long-time companion to my paternal grandparents. When they died, she stayed on—a very competent spinster, but steeped in Victorian customs. As a result, my teen years were not the best of times. Fortunately for both of us, summer vacations brought welcome relief.

I alternated visits with two of my mother's uncles, both of whom owned farms in northeastern Scotland. It was a time full of learning experiences and muscle-building chores. I worked with the farm hands at harvest time. I accompanied my uncles to livestock auctions. I drove a balky Fordson tractor. I worked on the moors cutting, drying, and transporting peat blocks for cooking and heating fuel. Magnificent Clydesdale horses hauled the carts. I was right-hand man to my uncle Willie, who loved to display livestock, vegetables and flowers for awards at local agricultural fairs. I still have the silver bowl he won for the best roses three years in a row.

Such was the variety of activities that the holidays were over all too soon, but not before another friend of the family, Commodore Harry Birnie, RN, DSO, arrived for his vacation, bringing with him an 18-foot sailing dinghy. He taught me to handle the small craft under sail, as well as some of the rudiments of seamanship and piloting. I owe much to my uncles and to another of my father's friends, a school sportsmaster whose generous support and tuition helped me to become a valuable member of the school's rugby and athletic teams. I may have been a spoiled only child, but these mentors of my teen years knew how to keep me busy, content, and challenged.

I saw little of my parents during 15 years of education. They returned to Aberdeen for four months' leave in 1930, 1935, and 1938—cumulatively one year in 15 years of separation.

When World War II was declared, I was in my third year of forestry studies at the University of Aberdeen. I did not wait to be called up: I volunteered for service in the Royal Navy. On reviewing my case, the Recruitment Board instructed me to complete my studies, and in the spring of 1940 I graduated with a BSc in Forestry.

Since 1938, it had been my intention to return to Malaysia and assume an assis-

tant manager's position in the rubber industry. But now, in time of war, and despite a firm job offer, I did not want to leave the homeland under threat of a German invasion.

For two years I worked with the wartime organization, Home Grown Timber Department of the Ministry of Supply, in Great Britain. Armed Forces service was deferred. Much of the work was the survey mapping and evaluation of the woodlands of the northeast of Scotland, first as an operations foreman, and then as an assistant acquisitions officer. When this job was completed I volunteered for flying duties. Then followed four years of active service, part of it in the Fleet Air Arm, and latterly in the Indian army.

My father had been taken prisoner in Singapore by the Japanese, and after his release in Kanchanaburi in 1945, where he had been labouring on the construction of the "Death Railway" between Thailand and Burma, we met in Calcutta for 10 wonderful days of reunion. We had been apart another seven years. He flew home to Scotland while I journeyed to Razmak, deep in tribal territory on the Afghanistan border of the North West Frontier Province, India (now Pakistan). There I joined the 6/11 Sikhs and served out my time in the armed forces.

By Christmas 1946, I was a civilian and a landed immigrant in Toronto, reunited with my fiancée, Win. We had been engaged for three years, and in February 1947 we were married at her home in Vancouver. I had had my fill of separation from loved ones. Win and I were never apart again until she died in 1991.

Warrack's professional career with the B.C. Forest Service began in 1947 when he was hired as a research silviculturist. He also took on the task of administering the Cowichan Lake Research Station. A substantial part of his research was focused on establishing thinning experiments in small-scale plots, as well as on large areas where the economic feasibility of thinning was tested. He also pioneered thinning research in red alder at a time when it was regarded as a non-commercial tree species.

In 1960, Warrack obtained his Masters in Forestry from the University of Michigan and 2 years later he was promoted to program supervisor and assistant to Dick Spilsbury, the forester then in charge of the Research Division. Along with these duties, Warrack maintained the responsibility for thinning experiments, ably assisted by Ken Bradley.

Dick Spilsbury retired in 1972 and Warrack took on the leadership of the Research Division. This was a time when the pendulum of public awareness was swinging slowly to environmental considerations—assessments of which, in the final analysis, did not necessarily emphasize increased yields from future forests. Accordingly, Warrack set a course for research that would more strongly reflect these growing public concerns.

Realistically, he recognized that extra resources could not become available immediately. He welcomed integrated research and tapped human resources within the B.C. Forest Service and also the university, federal, and industry research sectors. While he was a program supervisor, he had been appointed the first co-ordinator and planner of the program for the Forest Productivity Committee, and he continued to play a key role as a member of this committee when he was manager of research. He was also a member of the working committee of the Forest Research Council, and during his last years as manager, he served as a member of the executive of the Canadian Council of Resource and Environment Ministers. He welcomed an opportunity to contribute measured counsel to a national forest policy project.

A unique assignment, also on the federal/provincial scene, was Warrack's

appointment to the forest sector working committee of the national Metric Commission as a representative of British Columbia. It was an interesting diversion from divisional responsibilities, having to cope with resistance to change and help agencies with the practicalities of understanding and adopting an unfamiliar system of measurement.

Given the background of an ever-diminishing environment remaining in its original state, Warrack can take satisfaction that the program directives of the 1970s proved to be astute and durable. Two activities serve as illustrations: ecosystem function and management; and tree improvement, which included land acquisition for an additional tree breeding centre at Kalamalka, near Vernon.

Both programs had to be greatly changed in scope. Both had a long-term perspective and had to begin without securing a long-term financial commitment. Now, some 20 years later, after painstaking and devoted work by several research sectors, both programs are providing timely aid to resource managers who are responsible for land management and silvicultural practices on a site-specific basis.

Warrack retired from the Research Division in 1978 and made his home in Comox, on Vancouver Island. He is a life member of the Association of B.C. Forest Professionals, a Fellow of the Institute of Chartered Foresters of Great Britain, and a recipient of Her Majesty's Canadian Silver Jubilee Medal.

APPENDIX 2 Timeline of Accomplishments, 1912–1970

1912 The B.C. Forest Branch was created on February 27. Initial emphasis was on forest tenures, forest protection, timber harvesting, and revenue generation.

1921 James (Alex) Alexander was assigned research duties within the B.C. Forest Branch. He investigated timber utilization, slash disposal, natural regeneration, growth and yield, and fire protection, and produced timber volume tables.

1923 Arthur Pickford was hired to study the natural regeneration of Douglas-fir.

Assistant Chief Forester Robert St. Clair recommended the establishment of forest experimental stations in the major forest types of the province.

1924 Percy Barr began development work at the Aleza Lake Experiment Station near Prince George in May, the objectives being to demonstrate the practical aspects of sustained-yield forestry and to study the natural regeneration of spruce forests.

1925 A forest inventory was carried out for the Aleza Lake Experiment Station. Tent facilities were adequate to house and feed over 40 people. In October a training school for rangers was held, with Percy Barr and Ernest Manning providing instruction.

The dissemination of tree seed was studied on Vancouver Island.

1926 The forest inventory was completed and more research projects initiated at the Aleza Lake Experiment Station. Twelve permanent sample plots were established. Harvesting operations commenced during the winter.

A study of the survival of naturally regenerated coastal tree species began at Gordon Pasha Lakes, east of Powell River.

1927 The Research Division was formally established within the B.C. Forest Branch, with a staff of seven and annual expenditures of $34 000. The director was Percy Barr.

Additional personnel were hired to work at the Aleza Lake Experiment Station.

Arthur Pickford was placed in charge of the experimental Shelbourne Street nursery in Saanich and the first tree seeds were sown in research trials.

The efficiency of spark arrestors on logging machinery was studied and investigations carried out on the rates of spread and intensity of several slashburns.

1928 Eighteen plots were laid out at Cowichan Lake to examine the effects of slope, aspect, and slashburning on germination and survival of Douglas-fir, western redcedar, western hemlock, and Sitka spruce.

Thirty beds of Douglas-fir and Sitka spruce were sown at the Shelbourne Street nursery in order to develop nursery practice techniques.

1929 The 162-ha Cowichan Lake Research Station was established on southern Vancouver Island for long-term research on Douglas-fir, with Cliff Riley overseeing its development. The first coastal Douglas-fir thinning plots in the province were set up on the Cowichan Lake property.

1930 The Research Division of the B.C. Forest Branch was the largest and most active forest research organization in Canada. The annual research budget of $55 748 exceeded that of the Dominion Forest Service.

Percy Barr attended Yale University while an employee of the B.C. Forest Branch, obtaining his MF degree in 1925 and his PhD in 1929. His investigations at the Aleza Lake Experiment Station were summarized in "The effect of soil moisture on the establishment of spruce reproduction in British Columbia," Yale University School of Forestry Bulletin No. 26.

Douglas-fir pruning trials began at the Cowichan Lake Research Station.

The joint federal–provincial National Forest Inventory program resulted in two Dominion Forest Service field crews being assigned to study the rate of growth of coastal forests on East Thurlow Island, near Elk Bay on Vancouver Island, and near Ocean Falls.

The first 26 ha of the Green Timbers plantation in Surrey were established on March 15 in a ceremonial planting using 2-year-old seedlings from the Shelbourne Street nursery. This was the first major reforestation effort in the province and many dignitaries took part. It was decided to start a nursery at Green Timbers and the complex became known as the Green Timbers Forestry Station.

1931 A provincially funded unemployment relief program at the Cowichan Lake Research Station resulted in trails and roads being built and improved. Twenty-two ha of land on the North Arm of Cowichan Lake were added to the station's property.

In co-operation with the Elk River Timber Company, 405 ha of land near Campbell River were permanently set aside for reforestation experiments, and Douglas-fir and Sitka spruce were planted on 7 ha. This land was known as the Campbell River Experimental Forest.

About 700 000 seedlings were transplanted from the Shelbourne Street nursery in Saanich to the Green Timbers nursery in Surrey, where 3 ha were devoted to seedling production, and clearing was done on another hectare.

1932 The head of the Research Division, Percy Barr, left to take up teaching duties at the School of Forestry of the University of California at Berkeley. Other staff also departed during the early to mid-1930s, much reducing the division's capabilities.

Ninety-six ha of experimental plantings were established in March on West Thurlow Island. Just over 20% of the planting crew had university degrees in Forestry. Twenty-four ha were planted at the Campbell River Experimental Forest.

1933 The annual research budget was reduced to $11 000 and only four staff members remained. The division was placed under the supervision of the assistant chief forester.

By this time the Research Program had established 256 permanent

sample plots for the purposes of studying growth and yield (105 plots), plantation performance (60), silvicultural practices (82), and forest regeneration (9). The regeneration studies also involved 2896 temporary sample plots.

The last crop from the Shelbourne Street nursery, 142 000 seedlings, was lifted in early spring and shipped to the Green Timbers nursery in Surrey. The Shelbourne Street nursery produced 987 000 seedlings during its 5½-year lifetime. The property was turned back to the Municipality of Saanich. It was decided to produce 500 000 seedlings at Green Timbers nursery in 1937.

An additional 10 ha in the Campbell River Experimental Forest were planted.

1934 Federally funded unemployment relief programs resulted in men being stationed at both the Aleza Lake and Cowichan Lake stations, where they built roads and constructed various buildings. Somewhat ironically, research at the Aleza Lake Experiment Station stopped and the research buildings were boarded up.

The Green Timbers nursery, under the management of the Research Division, provided 84 000 seedlings for experimental plantings and an additional 19 000 for other purposes. One hundred seedbeds were put in, with a production target of 400 000 seedlings for 1936.

An additional 4.5 ha at the Green Timbers Forestry Station were planted, bringing the total to 105 ha. At the Campbell River Experimental Forest 29 ha were planted, bringing the total there to 67 ha. The total area reforested to 1934 was just over 400 ha, all of which was considered experimental, as both nursery and reforestation practices were still in the developmental stages.

Two publications were produced: *A pocket guide to the trees and shrubs of British Columbia* by Braham Griffith and "Growing coniferous trees in British Columbia" by Findlay McKinnon.

1935 Ernest Manning became chief forester, and his successor as assistant chief forester and forester in charge of research was C.D. Orchard.

The provincial Young Men's Forestry Training Plan was created in May to provide work and forestry training for 500 unemployed men. Sixty men arrived at the Cowichan Lake Research Station on June 8 and began construction of camp facilities, roads, and trails.

About 14 000 ha of harvested Vacant Crown Land were examined and 6000 ha selected for reforestation, at Campbell River, Read Bay (north of Kelsey Bay), and Grassy Creek (Loughborough Inlet).

1936 Only two researchers remained in the Research Division: Eric Garman and Findlay McKinnon. Nevertheless, growth and yield work continued, with nine new permanent plots established and 21 re-measured.

The results of a project initiated in 1928 on 53 000 ha of harvested land in the coastal Douglas-fir type indicated that two-thirds of the study area was understocked or barren. The absence of adequate regeneration was due to the lack of mature trees close enough to provide seed, and to fire destroying seedlings that had established.

The Young Men's Forestry Training Plan carried out many improvements at the Aleza Lake Experiment Station but the research program there remained dormant. Similar work was done at the Cowichan Lake

Research Station and a first aid course was taught.

The federal–provincial Forest Development Project, modelled after the Young Men's Forestry Training Plan, also resulted in men being stationed at the Green Timbers and Cowichan Lake stations, where they cleared land, built roads, trails, and firebreaks, pruned trees, and thinned stands.

Due to extreme weather conditions, production at the Green Timbers nursery was only 100 000 seedlings. The Green Timbers Forestry Station became known as the Green Timbers Forest Experiment Station.

The area reforested to date on the South Coast totalled 465 ha.

1937 Chief Forester Ernest Manning recruited Angus MacBean to rebuild the Research Division.

The Young Men's Forestry Training Plan and the Forest Development Plan resulted in work being carried out at all three stations, which also acted as clearing centres for men who were to be sent out to more isolated areas.

Three million seedlings were growing in the Green Timbers nursery but would not be ready for planting out until 1940. Adverse weather conditions during the summer of 1935 and the fall of 1936 reduced the planting stock available for 1937. Consequently, only 10 000 trees were planted on 4 ha on the Green Timbers grounds.

It was anticipated that 222 000 seedlings would be ready in the spring of 1938 and 2 000 000 for the spring of 1939.

1938 The Forest Development Project and Youth Forestry Training Plan were both expanded, employing 4694 men, some of whom were housed at the stations. Much work was done on the station grounds and elsewhere, especially on park facilities development, forest protection activities, land clearing, and road building. Sixty-five ha were reforested near Great Central Lake, in the Sayward Provincial Forest, at Elk Falls Provincial Park, and at the Green Timbers Forest Experiment Station.

On August 9 the Hon. A. Wells Gray, Minister of Lands, announced that the nursery program would be expanded to permit the reforestation of up to 4000 ha of land on Vancouver Island and the Lower Mainland each year. This translated to 10 000 000 seedlings, and plans were made to boost annual production at the Green Timbers nursery to 6 000 000 and establish a second nursery at Quinsam River, near Campbell River, to produce the other 4 000 000. The need for artificial reforestation was emphasized by several serious forest fires on the South Coast, which burned significant areas of young forest and killed seed trees that were to have provided natural regeneration.

1939 The Research and Forest Survey divisions of the B.C. Forest Branch merged to become the Economics Division, responsible for reforestation, forest surveys, aerial surveys, and research. This was done to improve supervision and eliminate duplication of effort due to overlaps that were developing between the two programs. The forest nurseries passed out of the Research Division, in the sense that it no longer existed, although the same staff members were responsible for them. Similarly, reforestation was no longer a direct responsibility of the Research Program.

The Forest Development Project, National Forestry Program, and Youth Forestry Training Plan carried out improvement work at the stations, developed the Campbell River nursery, and reforested land near Campbell River. Eighty-four men were based at the forest experimental stations. The Cowichan Lake Research Station, Campbell River nursery, and Aleza Lake Experiment Station once more acted as clearing centres for men assigned to projects in those regions.

Research continued on Douglas-fir seed crop periodicity, seed predation, germination, and survival. Western hemlock stands near Quatsino Sound were studied to learn more about the silvics of that species and its associates (western redcedar, Sitka spruce, and amabilis fir).

A soil classification of the Cowichan Lake Research Station, which began in 1938, was finished. A policy of carrying out soil surveys prior to all reforestation work was adopted to ensure that forest land rather than potentially arable land was replanted.

Two pathologists from the Ottawa office of the Dominion Department of Agriculture spent several months in British Columbia studying root rot of Douglas-fir on Vancouver Island.

1940 Work continued on: seed production, dissemination, and survival; germination and survival of seedlings; and the early growth of coastal forests. Pruning and thinning trials were re-measured as well.

Work also began on the successional development of herbs and shrubs following harvesting on coastal sites.

Forest pathologists and entomologists working for the federal government were stationed at the Cowichan Lake Research Station. The Douglas-fir thinning trial plots were treated for the second time by heavy and very heavy low and crown thinnings.

1941 Research began on selection harvesting in the Engelmann spruce forests of the Okanagan Provincial Forest in response to unsatisfactory natural regeneration and excessive slash resulting from clearcutting.

Soil surveys were carried out on nearly 33 000 ha between Duncan and Campbell River, adding to that done in 1940 (75 000 ha) and 1939 (10 500 ha). Research continued on forest site classification using plant indicator species and soil productivity in relation to topography and soil moisture.

Reforestation crews were billeted at the Cowichan Lake Research Station for the first time. Tree planting took place between Mesachie Lake and the village of Lake Cowichan.

A lease was signed with the Dominion Forestry Service, allowing their researchers to use two bunkhouses at the Cowichan Lake Research Station for 25 years. Malcolm Prebble, Ken Graham, Jack Bier, and Don Buckland were among the first to make use of the camp.

1942 The plots established in 1930 on East Thurlow Island and at Elk Bay on Vancouver Island to study the development of western hemlock–Douglas-fir stands were re-measured, as were 21 others in pure Douglas-fir types.

Research continued on Douglas-fir seed production, seed predation, and seedling germination and survival. An increasing emphasis was being placed on cone crop prediction. The patch harvesting layout

was again shown to be advantageous for natural regeneration.

The area subjected to soil surveys increased to total 222 000 ha from Mill Bay to the Salmon River on the east coast of Vancouver Island and at the head of Alberni Inlet. This work was carried out in conjunction with the Dominion Experimental Farms Service of Ottawa and the provincial Department of Agriculture to permit planned regional development. Other soil surveys were done on 10 500 ha scheduled for reforestation.

A detailed study of pruning 12-year-old Douglas-fir was initiated on 1.5 ha at the Green Timbers property.

A crew of Alternative Service Workers (conscientious objectors) was stationed at the Cowichan Lake Research Station. They were primarily responsible for fire suppression in the surrounding area but also converted disused railway grades into roads, dismantled abandoned logging camps, felled snags in areas slated for reforestation, and planted trees.

1943 Due to enlistments in the armed services the number of employees in the Forest Economics Division was reduced to 24 from the 1939 complement of 50. In spite of the reduction in personnel, re-measurement of permanent plots on Vancouver Island and at the Aleza Lake Experiment Station was carried out.

A statistical analysis of various cubic-foot scaling methodologies was initiated in order to recommend a system that could be adapted to local conditions.

Increased utilization of the western hemlock forests of southwest Vancouver Island prompted a study of the silvics of that species. Recommendations were made to harvest into the prevailing south and east winds, broadcast burn some western hemlock types, and protect the naturally reseeded areas from fire in order to ensure a second crop.

Analysis of the third 5-year re-examination of lands near Alouette and Cowichan lakes indicated that restocking is satisfactory if seed trees are on or adjacent to harvested or harvested and burned areas. The Cowichan Lake lands consist of 40 000 ha, of which 24 500 ha were cutover, 5100 ha were fire-killed standing timber, and 6900 ha were merchantable timber. About 20% of the cutover area was considered adequately stocked.

Research on selection harvesting in the Engelmann spruce forests of the Okanagan Provincial Forest revealed that windthrow there was much reduced in selectively harvested stands compared to clearcuts, and that logging slash levels were also less.

The "Ladysmith Pulpwood Salvage Experiment," carried out with the Powell River Company, Ltd. and the Comox Logging and Railway Company, Ltd. showed that sound small wood previously left behind after harvesting could be economically extracted and used for pulp production. Light and fast mobile yarders brought small western hemlock, Douglas-fir, and western white pine logs to the roadside. By the end of the year, 66 ha had been yarded out of 105 that had been felled and bucked. Salvaged wood accounted for 21% of the total harvest, the rest having been taken in the first pass for sawlog production.

Soil surveys on southeastern Vancouver Island were completed by examining the Saanich Peninsula, Metchosin, and Sooke areas.

Analysis showed that of 254 000 ha examined, 66 400 ha were arable land and 147 000 ha were not. The remaining 40 600 ha were generally non-arable but contained arable portions. The study's conclusions were that an increase in settlement could be supported by the available farmland and that restoration and improvement of the forest resources could be achieved through intensive use of the non-arable and marginal-quality soils.

1944 No permanent plots were re-measured this year due to a lack of available boat transportation. However, data compilation and analysis were carried out to check the yield tables.

Studies continued on seed production, dissemination, and survival, as well as seedling survival. The Cowichan Lake study area showed a pronounced influence of aspect, with Douglas-fir establishing on south and west aspects, and western hemlock and western redcedar on north and east aspects.

Co-operative work, begun in 1938 with the Ash River operation of the Alberni Pacific Lumber Company, indicated that the use of staggered settings, or patch cutting, resulted in one-half of the cutover land restocking naturally. This was double the restocking rate of lands harvested without regard to natural regeneration processes.

The "Ladysmith Pulpwood Salvage Experiment" carried on, concentrating on bucking, loading, dumping, booming, towing, milling, and pulping. It was concluded that small salvaged material could be successfully transported and processed into pulp but that the economics of the entire operation depended on the types of equipment used in all phases of the operation.

Studies of site classification, soil productivity, and forest growth identified 11 plant communities ranging from very wet to very dry conditions. Each plant community appeared to have its own tree age to height relationship. Soil analyses for the 165 plots established were expected to shed more light on factors influencing site quality.

1945 On April 5 the Department of Lands was reorganized to become the Department of Lands and Forests, with a deputy minister of Lands and a deputy minister of Forests. The B.C. Forest Branch became the B.C. Forest Service and reported to its own deputy minister.

The report of the second Royal Commission on forestry, headed by the Honourable Chief Justice Gordon McGregor Sloan, was submitted to the Legislature in December. The main focus was the institution of sustained-yield forest management, and Sloan stressed the need for a "vigorous" forest research program.

Thirty-one permanent plots were re-measured and new plots established to determine the yield of western hemlock forests of western Vancouver Island and the Sitka spruce- western hemlock types of the Queen Charlotte Islands.

A summary was made of the development and growth of the spruce–subalpine fir forests at the Aleza Lake Experiment Station based on 15 years worth of data from 13 permanent plots. Harvested white spruce–subalpine fir forests between Prince George and Dome Creek were examined by means of 270 temporary plots covering 95 ha. It was found that forests harvested to a 30-cm diameter limit and not

burned were regenerating satisfactorily. Large openings were not regenerating as well.

In spite of a continued lack of experienced personnel, the thinning and pruning plots at the Cowichan Lake Research Station were remeasured, as well as those designed to track seed production, natural regeneration rates, and seedling survival.

Site classification studies continued on Vancouver Island, with 140 temporary and 40 permanent plots examined in the Douglas-fir type to refine the relationships between vegetation and site quality expressed as dominant tree height, mean tree height, average diameter, and stand volume.

Research expenditures for 1945 totalled $10 766. By comparison, $6 763 was spent on forest inventory, $95 364 on reforestation, and $22 479 on development of provincial parks.

1946 An additional 42 plots were established on the Queen Charlotte Islands to bring the provincial total to 559 permanent sample plots. Volume tables were produced for immature Sitka spruce and for mature Douglas-fir, western hemlock, and western redcedar.

A utilization study showed that top diameters inside bark, as used in the standard tables, were appropriate for cruising in coastal forests.

Silvicultural research continued in areas of seed production, natural regeneration, direct seeding, pruning, and thinning. The Douglas-fir in the pruning plots at the Green Timbers Forestry Station were pruned once more between heights of 2.1 and 3.9 m, and different pruning methods compared.

The classification of coastal Douglas-fir forests begun in 1944 was completed. Based on A.K. Cajander's work on plant indicators in Finland, this research was extended to western Washington and Oregon in co-operation with the U.S. Forest Service. Four general climatic subdivisions were identified, ranging from the wet coastal western hemlock–western redcedar–Sitka spruce forests to the Garry oak grasslands, which experience dry summers.

The Douglas-fir type was studied in detail and five plant communities described. It was concluded that using vegetation types to delineate and map individual sites is an improvement over the conventional method employing graphical abstractions of tree height data. The techniques of site typing will be applied to recently harvested and burned lands to determine their applicability to areas lacking a forest canopy.

1947 The site type approach to forest land classification culminated in the publication by R.H. (Dick) Spilsbury and D.S. Smith of "Forest site types of the Pacific Northwest," B.C. Forest Service Technical Publication T30. Work continued on site typing second-growth western hemlock stands and Douglas fir–western hemlock forests above 450 m elevation.

Additional permanent sample plots were established, bringing the provincial total to 616. Volume tables were produced for mature western hemlock, Sitka spruce, balsam, and interior spruce. Scaling studies determined the formula for calculation of immature tree volumes in cubic feet and the relationship between cubic foot scale, board foot scale, and mill tally.

Forest development studies continued to examine growth,

increment, and mortality of different tree species in mixed stands. The succession of species on landslides in Smith Inlet was found to be: red alder–western hemlock; Sitka spruce; amabilis fir–western redcedar. Vigorous shrub development on valley-bottom sites poses a problem for western hemlock and Sitka spruce, and the best western redcedar regeneration is found on old burns.

The Douglas-fir thinning plots at the Cowichan Lake Research Station were thinned for the third time. The moderate low and crown thinnings removed 20% of the basal area, while the heavy low and crown thinnings removed 25% of the basal area. Further study of the pruned Douglas-fir at the Green Timbers Forestry Station and the Cowichan Lake Research Station compared the cost of pruning to the expected wood quality benefits.

Direct seeding experiments with western hemlock and western redcedar were carried out near Duncan, on southern Vancouver Island, in 1946 and examined in 1948. Average germination amounted to 1600 western hemlock and 1235 western redcedar per ha. A preliminary trial was started to evaluate the effectiveness of seed treated with rodent repellent.

Various fertilizers were applied to nursery beds to determine seedling response. Work continued to evaluate soil fertility, chemical composition of seedlings, and growth characteristics of 2+0 nursery stock at the Green Timbers, Quinsam, and Duncan forest nurseries.

1948 An additional 145 permanent sample plots were established on the North Coast and in the upper Fraser River watershed. Volume tables were produced for Douglas-fir, western hemlock, western redcedar, coastal true fir, and Sitka spruce. Analysis continued on the data from all permanent plots.

Results of a study initiated in 1926 in selectively harvested lodgepole pine–spruce–subalpine fir stands indicated that the pine should be removed down to a lower diameter limit so as to create post-harvest conditions conducive to the growth and development of the understorey of spruce and fir. This method enables the latter two species to reach a comparable volume 27 years earlier than a stand of the same composition established after clearcutting.

Work continued on seed production, direct seeding and rodent repellents, and pruning of Douglas-fir. Two thinning experiments began at the Cowichan Lake Research Station—one in red alder and the other in Douglas-fir.

Soil and site type studies were carried out in second-growth western hemlock forests near Nootka on the west coast of Vancouver Island. A site type survey was done in co-operation with a private company and much was learned about indicator species and survey techniques.

1949 Research at the Aleza Lake Experiment Station was reactivated under the supervision of Research Forester Larry deGrace. A residence for the research forester was constructed and formed part of the B.C. Forest Service complex, in conjunction with the district ranger's headquarters.

A new working plan was begun for the Cowichan Lake Research Station, which now totalled 325 ha. New information was collected during the summer to enable production of detailed topographic,

forest cover, soil, and vegetation site type maps.

Vladimir Krajina of the Department of Botany at the University of British Columbia began work on his biogeoclimatic ecosystem classification. He worked with Dick Spilsbury to classify the Douglas-fir forests of Vancouver Island. Three forest companies expressed interest in using indicator species to map forest site types.

Soil surveys in the Bella Coola valley delineated potentially arable lands and indicated the potential for agricultural development.

Forest nursery fertility studies continued and a field survey determined the best location for a new nursery between Cranbrook and Kimberley. Studies on cone crop fluctuations and seasonal development were carried out near Cowichan Lake and on the grounds of the experimental station there. Additional work examined the period of seedfall for Douglas-fir, western hemlock, grand fir, and western redcedar, and prevention of seed predation by rodents.

Permanent sample plots were re-measured and 25 new ones established. Volume tables were produced for six species or species groups, thus completing site class tables for all mature commercial conifers.

1950 Headquarters research staff moved from an old house at 558 Michigan Street, Victoria, around the corner to larger quarters in an old house at 514 Government Street.

Development of the Aleza Lake Experiment Station continued. A number of people were stationed there during the summer, including high school students, general labourers, university students studying Forestry, a forest inventory party, and B.C. Forest Service staff. Areas of mature timber were cruised to mark for harvest, recently harvested areas were cruised to determine regeneration success and windthrow occurrence, and older harvested areas were cruised to forecast future growth. Strip and plot cruises were both used on each area to permit comparison of sampling reliability.

A working plan for the Aleza Lake property was developed based on data collected in 1949. The Air Survey Division of the Lands Service aided in the production of a detailed topographic map for 600 ha of the northwest portion of the station. Construction of topographic maps from aerial photographs for forest management was still considered experimental at the time.

A study on tree-length skidding initiated in 1949 near Aleza Lake revealed heavy damage to residual trees in spruce–balsam forests where harvesting took place in the summer. It was concluded that silvicultural aims and objectives need to be formulated early when planning operations in this forest type and that objectives for the residual stand on each timber sale need to be specified, and woods practices improved through education.

A comprehensive working plan was completed for the Cowichan Lake Research Station, covering the past, present, and next decade. Work continued on Douglas-fir stand improvement with a fourth thinning carried out in the plots established by Stig Schenström in 1929; five new plots were established to examine very heavy low thinnings, and a pruning and debudding experiment was set up in a 10-year-old plantation. Work began on the composition, development, and ecology of regeneration in forest canopy gaps caused by root rot at Cowichan Lake and in the Alberni area.

The trees in the experimental pruning trials at the Green Timbers Forest Experiment Station were pruned to a height of 6 m.

A decline in seedling growth at the Green Timbers, Quinsam, and Duncan forest nurseries continued, with only the Green Timbers situation being critical. Based on chemical analyses it was concluded that nursery soil fertilization should be considered. This would improve seedling survival, because studies in the Sayward Provincial Forest showed that all fertilized nursery stock have lower post-planting mortality rates, with nitrogen and potash fertilization producing the best results.

The results of several years of study of seed production were published in a report by Eric Garman entitled "Seed production by conifers in the Coastal Region of British Columbia." Other work continued regarding: the efficacy of rodent repellents used to treat Douglas-fir seed; germination of pelleted seed; cone production, maturation, and crop prediction; chemicals used to predict germination; and selection of better stands for cone collection.

Land use surveys were carried out in the Silverhope, Klesilkwa, and lower Skagit valleys to assess the agricultural potential and implications of the lower Skagit Valley being flooded by a dam on the Skagit River in Washington State.

The harvested and burned areas near Alouette and Cowichan lakes were examined for the fourth time and a report prepared. Volume tables were produced for mature Douglas-fir, western redcedar, and western hemlock.

The site type studies were broadened into regional ecological studies, in co-operation with the University of British Columbia. The objectives were to determine the regional plant associations and describe their tree cover and understorey vegetation.

1951 The Surveys and Inventory Division was created from the Economics Division, which was dissolved on January 1, 1951. The Research Division was therefore reconstituted as a separate entity. The annual research budget was $231 000 and 15 researchers were on staff.

A contour map for the Aleza Lake Experiment Station was completed, a road developed, and two timber sales advertised for public auction. One was harvested as an experimental trial, with all trees above a diameter of 22 cm marked for removal. Comparisons were made between the presence of young trees and tree mortality before and after harvesting.

The success of conifer regeneration on burned land in the Prince George Forest District was found to be generally insufficient on areas burned less than 50 years previously, except in the case of small burns on dry or rocky sites. The intent of this study was to compare the time required for restocking of open burned sites with the development of residual stands left after harvesting.

Lodgepole pine stands along the Canadian National Railway in the Prince George and Prince Rupert forest districts were examined to determine what conditions govern regeneration, and to determine the effects of past harvesting, especially repeated selective harvesting for railway tie production, on understorey vegetation, stand structure, and stand development.

The efficacy of several herbicides was evaluated at the Cowichan

Lake Research Station. Pruning, debudding, and thinning trials continued there, including the first commercial thinnings of some 50-year-old Douglas-fir stands on 20 ha (seven thinning plots and seven control plots).

Soil moisture studies began at the Cowichan Lake Research Station to determine the effect of thinning on soil moisture availability and utilization of any released water expressed as increased tree growth, changes in understorey vegetation, and/or evaporation through the overstorey.

A nursery was established at the Cowichan Lake Research Station to duplicate the growing conditions experienced by western hemlock seedlings. Three aspects of the study examined: the effect of different protective coverings (sawdust, branches, laths, and vermiculite) on seed germination; the effect of different light intensities (open, deciduous canopy, and dense coniferous canopy); and seedling density (nine different combinations of intensity and technique).

Direct seeding and rodent control trials were carried out in co-operation with the H.R. MacMillan Export Company near Port Alberni. Another study in the Alberni area showed that pelletization of Douglas-fir seed with a peat compound decreased germination from 64.5 to 44.75%.

Fertilizer trials at the Green Timbers and Quinsam nurseries shed light on seedling development, which was evaluated after outplanting at Mud and Lawson lakes near Campbell River.

A study was initiated with Western Forest Industries at their Meade Creek Division to test the effectiveness of residual groups of trees at cutblock boundaries in providing seed to harvested areas.

All plantations established between 1930 and 1944 at Green Timbers were examined, as were those dating from 1931 to 1934 in the Campbell River Experimental Forest. Permanent growth plot re-measurements totalled 118, with 30 new subplots established in the Nimpkish Valley.

Ecological surveys on the east and west coasts of Vancouver Island identified a number of forest associations and the factors responsible for tree species interactions and site productivity, including disturbances such as flooding, landslides, and fire and vegetation succession. The east coast studies were done in co-operation with the Department of Biology at the University of British Columbia. Similar work was done near Bolean Lake in the Kamloops Forest District, and nine blocks to test different silvicultural systems were established there on 175 ha. Those trials include single tree selection, salvage group selection, strip clearcutting, clearcutting with maximum impact, clearcutting with minimum impact, clearcutting and slashburning, and two control areas.

1952 Road improvements were made at the Aleza Lake Experiment Station, a new water system was installed, and a residence was constructed for the forest assistant. A timber sale scheduled to be cut in the winter of 1952–1953 will remove high-risk old trees and leave a thrifty young residual stand. A small area was cleared for a nursery.

Fire protection capabilities were enhanced at the Cowichan Lake Research Station. Over 100 visitors were received during the year, including a tour of 34 foresters from Commonwealth countries.
Work continued on herbicides, thinning in Douglas-fir and western

hemlock, heartwood formation in Douglas-fir, chemical debarking, group seed tree regeneration (in collaboration with Western Forest Industries at Meade Creek), cone crop production, direct seeding, and rodent ecology.

An 800-ha reserve on East Thurlow Island was developed, with boundary lines blazed, trails cleared, and bridges and culverts constructed. A small log cabin was built and ground prepared for a tent camp. The forest of 55-year-old western hemlock would be subjected to various thinning experiments and the camp would provide a base of operations without being a full-scale research station.

Boys' camps were established at Aleza Lake, Cowichan Lake, and East Thurlow Island and 35 boys provided with summer employment. They cleared trails, built bridges, blazed boundary lines, maintained camp facilities, and assisted with research projects. In addition, they were instructed in fire fighting techniques, and toured harvesting and sawmilling operations as well as B.C. Forest Service ranger stations and forest district offices.

Forest nursery research involved treating alkaline soils, using red alder shavings as a soil amendment, composting from wood waste and other materials, and using seedling morphology as an indicator of nursery fertility. Studies indicated some relationships between root pruning, nursery fertilization, and the survival of planted seedlings.

Ecological plots were established on the Queen Charlotte Islands, near Terrace, in the ponderosa pine–Douglas-fir forests of the southern Central Interior, at the Aleza Lake Experiment Station, and elsewhere in the Prince George Forest District.

Work continued at the Bolean Lake research site, examining harvesting methods, tree regeneration, and survival of transplanted stock at high elevations. The Vancouver Forest Products Laboratory of the Canada Department of Resources and Development studied harvesting methods, wood waste and breakage, and lumber grade yields. The Canada Department of Agriculture carried out studies of forest insects and diseases at the Bolean Lake site.

Permanent forest growth plots were re-measured and new ones established. Some were abandoned when they were incorporated into the proposed Kitimat townsite. Data analysis indicated that existing Douglas-fir yield tables required adjustment. A working plan was written to enable construction of new volume tables for the Surveys and Inventory Division.

1953 The Aleza Lake Experiment Station camp operated for 6 months, housing boys' crews, construction workers, and 12–30 researchers. Maintenance and improvement of facilities continued and a small experimental nursery was built to study appropriate techniques and methods for raising seedlings of species suited to northern conditions. In addition to local white spruce, subalpine fir, Douglas-fir, and white birch, five varieties of birch from Norway and Scots pine from Finland were also sown.

Construction began on a new cookhouse at the Cowichan Lake Research Station and other buildings were renovated or relocated. The boys' crews widened trails and improved roads and culverts to permit easier access in case of fire, and removed thinning waste from the Douglas-fir stands.

The forest genetics program began, with Alan Orr-Ewing in charge. The main objective was to improve the quality of Douglas-fir seed by determining which races and strains of the species exist, and to establish provenance trials to study the effects of location and elevation.

The study of heartwood formation in Douglas-fir concluded, as did one on chemical debarking. Progress continued on direct seeding and rodent control, thinning experiments at the Cowichan Lake Research Station and elsewhere, nursery practices, ecological classification, vegetation succession, silvicultural systems, regeneration of white spruce and subalpine fir, and forest–grassland dynamics.

1954 A legal survey of the boundaries of the Aleza Lake Experiment Station was carried out. A network of permanent plots was initiated, Scots pine from Finland was planted, the effects of seedbed type on tree regeneration was studied, and a timber sale was carried out. A Youth Training Camp assisted with research, construction, and maintenance.

Work at the Cowichan Lake Research Station was confined to facilities maintenance and repair. No research was done.

A land use survey was made of the Salmon River valley on Vancouver Island, a spruce bark beetle outbreak in the Yahk Provincial Forest was examined, and timber sales in the Prince George Forest District were studied. Ecological surveys were carried out on Vancouver Island between Jordan River and Quatsino Sound and at the Aleza Lake Experiment Station.

Research was done on rodent control, western hemlock and ponderosa pine thinning, Douglas-fir timber marking in the dry Interior, timber sale cruise accuracy, the differences between Engelmann and white spruce, partial cutting in the Interior wet belt, and nursery fertility.

The forest genetics program continued to develop in order to study Douglas-fir parent tree characteristics and define climatic zones. A stand of Douglas-fir was selected and seed collected from the best and poorest phenotypes for sowing. In addition, cuttings were taken from the parent trees for grafting onto ordinary stock to study the combining ability of different trees and the inheritance of branching characteristics. Controlled pollination tests were carried out to investigate self-incompatibility and the effects of inbreeding.

The first regional research officer appointment was that of M.B. (Bruce) Clark at Kamloops.

1955 No major projects were initiated at the Aleza Lake and Cowichan Lake stations. Twelve ha of land were cleared at the Cowichan Lake Research Station for the establishment of progeny testing trials.

Regeneration studies on the Queen Charlotte Islands indicated that restocking could take up to 10 years, even when sufficient coniferous seed sources were available. Dense brush and alder establishment can pose a problem under certain conditions.

The western hemlock thinning trial begun in 1953 on East Thurlow Island was concluded and a new one initiated in a 14-year-old Douglas-fir plantation near Campbell River. Ecological studies consisted of a reconnaissance of the northern coastal limit of Douglas-fir and the establishment of plots to determine the effect of slashburning on soil productivity.

Studies on cone crop production, direct seeding of Douglas-fir, rodent control, and regeneration continued on the Coast. The forest genetics program collected Douglas-fir seed for a provenance trial of strains from all over the Pacific Northwest.

It was found that many interior spruces exhibit characteristics intermediate between Engelmann and white spruce and cannot be classified as either one. Studies on seed production and regeneration in the spruce–subalpine fir type continued at Aleza Lake, and eight other sites in the vicinity were monitored. Data continued to be collected at the Bolean Lake trials on seed crops, seed dispersal, and regeneration.

In the Nelson Forest District, studies were initiated on partial cutting in a mixed stand in the Interior wet belt. A number of plots had to be abandoned after being damaged by a windstorm. Another study examined regeneration in a western redcedar–western hemlock type, comparing clearcutting with clearcutting and slashburning.

1956 Two timber sales were harvested at the Aleza Lake Experiment Station. One was a regeneration cut, with half of the total merchantable volume removed. The other was a heavy volume cut, retaining an adequate residual stand. Two new timber sales were prepared, auctioned, and carried out. Both were clearcuts in alternate strips, and on one the cut strips were scarified prior to harvesting.

All seedlings from the Aleza Lake Experiment Station's nursery were transplanted in the spring. Additional stock was raised at the Canada Department of Agriculture Experimental Farm in Prince George because the existing forest nursery still lacked capacity. Another Youth Training Program crew was stationed at Aleza Lake during the summer and they collected cones, stabilized road cuts, and assisted with research.

Four trial plantations were established at Giscome, Pinchi Lake, Summit Lake, and Aleza Lake. Engelmann and white spruce plus Douglas-fir were planted in areas chosen to represent difficult situations—heavily burned, brushy, or covered with slash and windfall. Scarification trials were initiated to compare the effects of five different types of equipment.

Construction began on a new office and warehouse at the Cowichan Lake Research Station and maintenance work was carried out. A planting site for the genetics program was improved and experimental areas thinned and pruned. Seeds of some exotic species (oaks, Spanish chestnut, horsechestnut, planetree maple, European ash, and *Nothofagus*) were sown at the nursery in Duncan for eventual outplanting at the research station.

Twenty permanent growth and yield plots on the Queen Charlotte Islands and 33 plots in a thinning trial at Cowichan Lake were remeasured and four more established near Gold River. A study was initiated to determine the relationships between climatic conditions and the altitudinal distribution of native conifers. Work continued on direct seeding of Douglas-fir and rodent control, as well as grafting techniques in Douglas-fir seed orchards. A seed registration system was implemented.

Slashburning effects on soil productivity were studied further, cone production was tracked on the Coast and in the Interior, and factors

influencing the regeneration of interior Douglas-fir, spruce, ponderosa pine, western hemlock, and western redcedar were examined.

A new project was begun to determine the ecological factors affecting Engelmann spruce–subalpine fir forests and develop a classification system that reflects the influences of site, age, stand structure, species composition, and vigour. A study on the ecology of lodgepole pine was initiated in the Kamloops Forest District. In the Nelson Forest District a new partial cutting experiment was established in the Arrow Lakes area to replace the one destroyed by wind in 1955. The new plots consisted of 80-year-old Douglas-fir, western hemlock, western redcedar, and western white pine.

Plantations of exotic species were documented and examined. Eighty species had been introduced in British Columbia up to 1956. Legislation requiring seed source registration officially initiated the first tree improvement program for Douglas-fir.

Mike Stewart was appointed as the regional research officer at Nelson.

1957 Construction began on a new 32-person dormitory at the Cowichan Lake Research Station to house reforestation crews working in the Cowichan Valley. A new office/warehouse was finished and other buildings re-roofed.

A study of veneer recovery from thinned and pruned versus untreated Douglas-fir stands of the same age indicated that pruning was necessary and practical in such young stands. Eight ha near the Cowichan Lake station were cleared to make way for the establishment of an international Douglas-fir provenance study.

The young exotic species (oaks, Spanish chestnut, horsechestnut, planetree maple, European ash, and *Nothofagus*) sown at the nursery in Duncan in 1956 were outplanted at the Cowichan Lake Research Station.

Ninety-two growth and yield plots at the East Thurlow Island Experimental Substation were re-measured, along with 75 others elsewhere on the South Coast.

The Aleza Lake Experiment Station camp operated from May to November. A silviculture crew of 20 men from the Prince George Forest District participated in a week-long training session at the station. Research foresters provided assistance. Roadside slash was disposed of, a new road right-of-way cleared, and the water supply's dam and pipeline repaired.

Two timber sales were completed at Aleza Lake, one in the Clearcut Working Circle and the other in the Long-term Selection Working Circle. A second sale in the Clearcut Working Circle was begun but not completed. Scarification and planting demonstrations were carried out at the Aleza Lake Experiment Station, elsewhere in the Prince George Forest District, and at Smithers Landing in the Prince Rupert Forest District. Also in that region, a plantation of Douglas-fir, Engelmann spruce, and Scots pine was established in the Chapman Road burn.

Direct seeding experiments on the Coast continued. One, carried out in co-operation with MacMillan Bloedel Ltd. and Okanagan Helicopters, involved the release of Douglas-fir seed from various altitudes.

Another, in co-operation with the Elk River Timber Company, was a broadcast seeding on 80 ha. The chemical Endrin showed promise as a rodent control agent.

A problem analysis of the regeneration of coastal western hemlock indicated that brush control on highly productive sites by slashburning or chemical application might be warranted. The role of planting and the use of appropriate tree species were also of concern. Slashburning effects on soil productivity were assessed by collecting information on soil temperature and moisture relationships and on seedling growth in intact, harvested, and harvested and burned areas.

Plus trees were selected for the first high-elevation Douglas-fir seed orchard, studies on inbreeding and phenotype evaluation continued, and a new seed classification and registration system was put into operation.

Ecological investigations included the climatic and altitudinal distribution of coastal conifers, the collection of 23 seedlots from six species for testing the influence of environment on tree vigour and growth, and the classification of lodgepole pine stands in the Kamloops area. Mixed stands in the Interior were examined to determine the course of successional development.

Interior species were studied with regard to seed crops, seed dissemination, seedbeds, and the influence of rodents in the Kamloops and Prince George forest districts. Both planting and direct seeding trials were carried out with ponderosa pine, Douglas-fir, and Engelmann spruce. A problem analysis on areas scarified in 1956 determined the significance of the effects of vegetation that either sprouts from rootstocks or is a pioneer annual upon the germination and growth of coniferous seed.

The Arrow Lakes partial cutting plots were harvested and measurements taken to track future growth. A small plantation of exotic species (Scots pine, red pine, Maritime pine, European larch, and three provenances of ponderosa pine) was established near Clinton.

A study site established in 1929 at Myra, near Kelowna, to examine harvesting methods in the Engelmann spruce–subalpine fir type was re-examined to determine which factors affect the release of radial growth of the residual stand.

In co-operation with the Faculty of Agriculture at the University of British Columbia, a soil fertility study was started at the Green Timbers nursery. Various fertilizer combinations were applied at different rates and dates on both seedbeds and green manure crops.

Research personnel taught at the B.C. Forest Service Ranger School, courses on statistical sampling methods were given to district cruising officers, and assistance was provided to forest district silviculture training programs. Tree seed was sent to Sweden, India, Korea, Iceland, Denmark, Argentina, Oregon, and Ottawa.

Keith Illingworth was appointed the regional research officer for the Prince Rupert Forest District.

The third Royal Commission on forestry, again headed by Chief Justice Gordon McGregor Sloan, recommended that the Research Division be adequately equipped to provide "...vitally needed information on matters germane to the proper management of our forest resource."

1958 The Aleza Lake Experiment Station was open from early June to mid-December and housed a work crew as well as research staff. Road location, right-of-way clearing, and road construction occupied the work crew, who also cleared 4 ha for a nursery.

Research on harvesting methods continued at Aleza Lake, with two timber sales completed in the Clearcut Working Circle. Two others were in the Long-term Selection Working Circle—one completed and the other cruised and marked. Twenty-three permanent growth and yield plots were re-measured and a study made of soil and drainage conditions in relation to site quality and vegetative cover in co-operation with the Canada Department of Agriculture.

At the Cowichan Lake Research Station 8 ha were cleared to provide space for genetic research outplanting and 12 ha were commercially thinned using a rubber-tired yarder called the "Tree Farmer," designed for use in second-growth stands. This was the first use of this equipment in British Columbia.

Two ha were prepared for the establishment of a trial of mixed species planted alongside pure plantings of the same species at three different spacings. The species to be planted were Douglas-fir, western hemlock, and grand fir.

Other activities at the station included 4 days of instruction for students from the B.C. Forest Service Ranger School, a conference of all district silviculturists, and a meeting of the Vancouver Island Section of the Canadian Institute of Forestry. That program included activities such as plant identification, cruising, marking, and pruning.

Fourteen field crews worked in all forest districts. Studies of climatic influences continued in the Elk Valley on Vancouver Island, examining evaporation, wind, precipitation, temperature, date of flushing, pollen dispersal, and tree radial growth. New projects regarding microclimate and soil conditions were started in a slashburned site and a thinned second-growth stand.

Regeneration problems on the west and northeast coasts of Vancouver Island were studied, recommendations for future forest practices made, and a research program formulated.

A study was initiated to examine the length of time that scarified seedbeds in Engelmann spruce–subalpine fir types remain effective for natural regeneration. This is important because seed crops are sporadic and the seedbed deteriorates as competing vegetation invades the site.

The classification of lodgepole pine sites in the Southern Interior was completed and the study expanded to the Central Interior, where new or modified site types occur. The plantation of exotic species near Clinton was enlarged by the addition of Scots pine, Japanese red pine, Japanese black pine, and European larch. However, survival was poor due to the severity of the summer drought. White spruce near Prince George also suffered mortality: 58% of those planted in July and 10% planted in August. September planting mortality was zero.

Scions from Douglas-fir plus trees selected in 1957 were collected and grafted onto root stock. Ten more plus trees were located, completing the selections for a high-elevation seed orchard. In conjunction with the Forest Products Laboratory in Vancouver, wood characteristics such as specific gravity, fibre length, and spiral grain were assessed.

A series of studies was started to standardize methods for the handling and storage of cones and seed extraction. Seeds will be tested for storage characteristics and viability.

Studies continued on direct seeding, rodent control, thinning of several coniferous species, and nursery soil fertility.

1959 Emphasis at the Aleza Lake Experiment Station was on access development, including to the nursery. A new timber sale in the Long-term Selection Working Circle was prepared for auction. The facilities were open from May to December and used by operations staff, researchers, silviculture crews, and visitors.

Research officers met at the Cowichan Lake Research Station in March to discuss current projects and the co-ordination of future programs. Eight ha were cleared for the establishment of select genetic stock. Twelve ha of Douglas-fir were thinned and a number of sample plots in thinned stands were re-measured.

Most tree species produced good cone crops in 1959 and this enabled further studies on regeneration. Seedfall distance and direction in relation to weather conditions and seedling survival on different sites and seedbeds were examined on the west coast of Vancouver Island. Other studies concerned pollen dispersal, methods to gauge seed maturity, cone storage, and seed extraction.

Additional thinning was carried out at the East Thurlow Island Experiment Forest in 65 ha of western hemlock. This was a commercial operation. A number of sample plots previously thinned to various densities were re-measured.

Plus trees were selected for the high-elevation seed orchard. Assistance was received from the Plus Tree Board, a subcommittee of the Tree Farm Forestry Committee, which promoted industrial cooperation in the search for outstanding trees.

Application of peat moss dressings to beds at the East Kootenay nursery was found to increase germination and decrease mortality. In the Prince George Forest District, studies continued on cone and seed production in northern conifers. Direct seeding trials were carried out and white spruce plantations established to determine the effects of timing of planting and initial spacing. Additional scarification trials were conducted.

In the Prince Rupert Forest District a plantation of white spruce, Douglas-fir, and European larch was begun at Tachek Creek, adjacent to a spacing trial of white spruce. Ecological classification of lodgepole pine sites was extended to the Bulkley Valley and a new type discovered there.

1960 The Aleza Lake Experiment Station was open for 8 months and housed road maintenance and construction crews. No harvesting took place but three new timber sales were prepared: 335 ha in the Long-term Selection Working Circle, 27 ha in the Clearcut Working Circle, and 3 ha for nursery development.

At the Cowichan Lake Research Station 20 ha were cleared for special exotic species, and the forest genetics plantations were fenced against deer. Seedlings and graftings were set out as plus tree candidates. The camp was used by students from the B.C. Forest Service Ranger School, the Committee on Forest Tree Breeding for British

Columbia, and senior Forestry students from the University of British Columbia.

Due to poor markets for small wood, no thinning was carried out in the Cowichan Lake and East Thurlow Island trials. The tree breeding program continued to select plus trees for use in seed orchards. Ecological studies addressed the growth of seven tree species on the west coast of Vancouver Island and a provenance trial was established to determine the relationships between climatic factors and the distribution of Douglas-fir. Monitoring of the direction and distance of seedfall and their effects on germination and survival continued.

Fertility research begun in 1958 at Green Timbers was followed up by mineral fertilizer and organic amendment trials at the Duncan, Quinsam, and Green Timbers nurseries. Organic amendments were evaluated at the East Kootenay nursery. The growth of outplanted stock from the initial experiment at Green Timbers was tracked at five sites on Vancouver Island.

Seed dispersal of Douglas-fir, the effects of fire on regeneration of western redcedar and western hemlock, and scarification of Engelmann spruce–subalpine fir sites were studied in the Kamloops Forest District. Planting trials in the ponderosa pine type indicated that shading is not a major determinant of seedling survival but that site preparation and its effects on soil moisture and plant competition are significant influences. An examination was made of the effects of seeded grasses on tree regeneration in harvested areas but the results were inconclusive.

In the Nelson Forest District, additional ponderosa pine planting trials were established, investigations began into the montane site types, and a classification for Christmas tree production based on site types was developed.

Studies on white spruce planted throughout the growing season were repeated in the Prince George Forest District and survival and growth studies on areas scarified in 1956 were completed. A trial comparing Endrin-treated spruce seed to non-treated seed was initiated by sowings on 65 ha. Monitoring of the deterioration of scarified seedbeds indicated that development of three seasons' worth of competing vegetation prevents the establishment of spruce seedlings.

Five plantations had been established to date in the Prince Rupert Forest District to test different stock types. Two scarification trials near Babine Lake indicated that 2.5 hours per ha is sufficient to treat a site. The Dunemann nursery bed established in 1959 proved capable of producing nearly 2700 vigorous seedlings per m^2.

1961 An eight-person camp was constructed at the Aleza Lake Experiment Station, along with a sewage disposal system for it and the ranger station. New roads were located and built and just over 1 ha of the nursery site made ready for seeding in 1962. Two timber sales were completed and two others were still active, one in the Long-term Selection Working Circle and the other in the Clearcut Working Circle.

The major effort at the Cowichan Lake Research Station was the clearing of additional area for plantations of experimental trees.

Planting trials of Douglas-fir in the Kamloops Forest District continued in co-operation with S.M. Simpson Ltd. of Kelowna. Large

transplant stock was found to survive better than small transplant stock or seedlings. Grass seeding on burned areas did not adversely affect germination and survival of Douglas-fir during the first year but more comprehensive studies will be required to completely determine the interactions.

Harvested cutblocks in western redcedar–western hemlock types at the Arrow Lakes were examined with a view to studying seed dissemination of those species. Site preparation and planting trials of ponderosa pine showed the value of using large planting stock. Classification of site types was done in the Kettle Valley and East Kootenays, and a classification of Christmas tree growing sites was done in the Kamloops Forest District.

A wildfire destroyed several years' worth of plantation experiments at Buckhorn Lake, near Prince George, but work continued on seed production and broadcast seeding of spruce on burned areas. Lodgepole pine regeneration was studied in the Prince Rupert Forest District.

Fertilizer trials continued at all forest nurseries, including nitrogen application at Duncan and soil acidification at the East Kootenay nursery. Partial soil sterilants were used at Quinsam and Duncan, with promising results.

Seed dispersal studies on the West Coast were curtailed due to a lack of seed, and work concentrated on maintaining weather records in preparation for the 1961–1962 cone crop. A seedling survival study continued, species and spacing trials were established in readiness for planting, and the problem of brush competition in plantations was examined. Different types of Douglas-fir planting stock were considered and a set of minimum standards for acceptable planting stock proposed.

The tree breeding program concentrated on the selection of Douglas-fir plus trees, with 135 selected to date on Vancouver Island and the mainland. The first outplantings of some progeny were made. Research continued on the relationship between climatic factors and altitudinal provenances of Douglas-fir.

Studies of Douglas-fir pollen release on Vancouver Island were carried out to determine possible relationships to climatic zonation and influences at potential seed orchard sites.

1962 Clearing and grubbing of the nursery site at the Aleza Lake Experiment Station continued and beds were sown to white spruce in the spring (450 m^2) and fall (225 m^2). An additional 225 m^2 were prepared for sowing in the spring of 1963.

Progress on silvicultural investigations and development work during the previous 5 years at Aleza Lake were assessed in order to establish terms of reference and objectives for a revised working plan. Five km of road right-of-way were harvested and slashed, and a new road located. Timber sales were made in both working circles and new ones prepared for each.

The Cowichan Lake Research Station was maintained but no new work was undertaken. The station was used as a base of operations for a variety of studies being carried out in the area.

Seedfall records were kept for Vancouver Island and a study on

cone handling and seed processing neared completion. Several new plantations were established using different grades of Douglas-fir seedlings and stock held in cold storage for varying periods. A species and spacing trial was established on the west coast of Vancouver Island.

Other studies included the effects of soil properties on Douglas-fir seedling growth, brush control, and the effects of wildlife browsing on the growth of young forests. A number of thinning plots were examined.

Douglas-fir plus trees were located in the Kyuquot and Chilliwack areas, and scions collected from 134 trees in the spring for grafting in clone banks and seed orchards.

In the Kamloops Forest District a mature Engelmann spruce–subalpine fir stand subjected to various harvesting methods 10 years previously was examined. It was determined that the subsequent losses to windfall and other natural causes were greater than the growth of the residual trees. In association with the federal departments of Agriculture and Forestry, a classification of forested land based on landform, soils, and plant associations was initiated near Kamloops.

Direct seeding experiments were initiated in the Kamloops and Nelson forest districts. A seed dissemination study began in western redcedar–western hemlock types at the Arrow Lakes.

In the Prince George Forest District it was found that competing vegetation established on scarified sites quickly and then suppressed conifer seedlings within 3 years. Work continued on lodgepole pine in the Prince Rupert Forest District, including regeneration, seedling survival and development, and browsing by rodents.

1963 Due to high maintenance costs, the Aleza Lake Experiment Station was closed on December 11. It was felt that the expense of keeping the station in operation was hampering development of the forest district's research program. The station was to remain closed for a decade but managed by the Aleza Lake Ranger District on a sustained-yield basis, with silvicultural investigations continuing on a smaller scale.

At the Cowichan Lake Research Station a bareroot nursery for genetic research was cleared and fenced, and office and laboratory facilities expanded. This was part of a plan to consolidate all phases of the tree breeding program (processing seeds, raising seedlings, and establishing plantations) and provide facilities for future studies.

Plans were developed for comprehensive provenance studies of coastal Douglas-fir and interior white spruce. Field data were collected on Douglas-fir sites, and white spruce stands were examined and sampled for cone and needle characteristics. Cruising for plus trees continued in higher-elevation stands on Vancouver Island and the mainland, with 51 new trees being located and registered.

Grafting began in the high-elevation Douglas-fir seed orchard at Campbell River. A detailed analysis of the breeding program for coastal Douglas-fir concluded that tree breeding research would be kept separate from the more routine phases of plus tree cruising and seed orchard establishment.

A study was initiated to compare the performance of four types of Douglas-fir planting stock on highly productive land susceptible to rapid invasion by competing vegetation. It was felt that if such sites

were planted immediately following harvesting and prescribed burning and the stock did not experience a planting check, then plantation establishment would be successful. Seedlings were started for planting out in 1965.

Direct seeding experiments in the Kamloops Forest District indicated that the main limiting factors were rodents and climate. The former losses, especially with Douglas-fir, are controllable with a combination of seed treatment and seeding technique. Planting trials with Douglas-fir and Engelmann spruce began in order to determine the effect of season of planting and aspect on the survival of different classes of planting stock.

The classification of forest land near Quilchena, based on landform, soil, and plant associations, was completed and a second study begun near McGillivray Lake in co-operation with the B.C. Department of Agriculture and the Canada Department of Forestry.

Direct seeding trials in the Nelson Forest District showed highly variable results. A site near Revelstoke had higher survival of western white pine and Douglas-fir than Engelmann spruce and western hemlock. A spot sowing trial at Cedar Creek showed very erratic germination, regardless of species.

In the Prince George Forest District a long-term study on the influence of time on the effectiveness of scarified seedbeds neared completion. In the Prince Rupert Forest District a regeneration study of lodgepole pine was begun and a western hemlock spacing study started with wildling stock.

1964 Development of the research nursery and related facilities at the Cowichan Lake Research Station proceeded satisfactorily, with irrigation systems, drains, cold frames, and a soil storage shed being built. An additional 16 ha were cleared for use in progeny testing and clone banks.

Scions from all Douglas-fir plus trees selected in 1963 were collected and grafted onto existing clone banks. Thirty-six more plus trees were located, primarily on the mainland, and registered. The sixth Plus Tree Week, held in the Mission area, produced 16 more plus trees.

The first intraspecific crosses of Douglas-fir were made in 1963 and these continued on a larger scale in 1964, with pollen parents selected from British Columbia, Washington, Oregon, and California. The Douglas-fir provenance study was delayed by an inadequate seed crop, although some seed was collected near Pemberton and on southern Vancouver Island.

Foliage and cones were collected throughout the ranges of white and Engelmann spruce in order to delimit the pattern of variation in spruce, provide a basis for more intensive provenance research, establish seed transfer rules, and initiate a program of selection and breeding. Studies of germination and growth of numerous spruce seedlots were made in B.C. Forest Service nurseries and in a growth chamber in co-operation with the Faculty of Forestry at the University of British Columbia.

Land classification studies continued in the Southern Interior and Prince George areas in co-operation with the provincial and federal soil surveys and the faculties of Agriculture and Forestry at the

University of British Columbia.

Direct seeding studies in the Kamloops Forest District were encouraging, showing improved performance with broadcast and similar results with spot seedings. In the Nelson Forest District, spring sowings generally outperformed fall sowings, although sowing Douglas-fir in late July resulted in 92% of seed spots becoming stocked.

A new project was initiated in the Prince Rupert Forest District to examine spacing of overstocked juvenile lodgepole pine stands as a means to avoid stagnation in potential crop trees. The effects of different spacing regimes on the growth habit of selected trees will also be studied.

1965 A heavy snowfall resulted in considerable damage to the clone banks at the Cowichan Lake Research Station. The majority of scions grafted in 1964 were torn off or severely damaged, although many were salvaged and regrafted. In addition, scions from 32 new trees registered that year were added to the clone banks, for a total of 457 clones.

An additional 16 ha were cleared for development of new clone banks and 150 provenances of white and Engelmann spruce were sown and detailed assessments made of their development during the growing season.

In the station's nursery, 8500 1+0 seedlings from the controlled Douglas-fir crosses of 1963 were transplanted. Pollination of seven local trees in 1964 with pollen from the British Columbia interior, Washington, Oregon, and California produced over 20 600 seedlings for transplanting in 1966.

Plus tree selection work continued on the Coast, from Sechelt to Kimsquit, utilizing the launch *B.C. Forester*. This work was in cooperation with five member companies of the Tree Improvement Board and resulted in 66 new plus trees being registered. Scions were collected in November from 24 trees near Bella Coola.

Elsewhere in the Vancouver Forest District, 18 000 2-month-old Douglas-fir seedlings in 1.25-cm diameter plastic containers were planted in test plots. It was found that aspect and shade strongly influenced survival, which ranged from 0 to 65%. Another study suggested that the influence of care and handling on planting stock survival overrides the differences in age classes and size grades.

A western hemlock seed crop was studied in the Nelson Forest District. The results indicated that no appreciable amount of seed was disseminated more than 60 m from the source, that seed may travel farther upslope than downslope on southerly aspects due to mid-afternoon convection currents, and that seed dispersal is greater in the fall than in the winter.

A number of factors were found to be responsible for low survival in plantations in the Kamloops and Nelson forest districts: animals, poor planting practices, poor-quality stock, soil conditions, and lack of proper site preparation.

Nine direct seeding trials of spruce and lodgepole pine were begun in the Prince George Forest District, along with a spacing plot and a provenance trial for spruce. A final report on the influence of time on the effectiveness of scarified seedbeds concluded that the regrowth of competing vegetation limits tree seedling survival. It was found

to decline from 64% when planting takes place during the same year as scarification to 29% survival when it takes place 4 years after scarification.

A comprehensive problem analysis was completed for lodgepole pine research in the Prince Rupert Forest District in order to set up a 10-year research program. A plantation study comparing the performance of 2+1 versus 3+0 white spruce stock on brushy sites was established. Two spot seeding trials were begun, one on a freshly scarified area and the other in a recent spring burn. An extensive western hemlock planting trial was initiated in co-operation with Celgar Company Ltd. of Terrace to study the relationships of site, season, stock, planting methods, and soil properties to survival and early development of seedlings.

1966 Another heavy snowfall at the Cowichan Lake Research Station damaged the clone banks once again, tearing many 1965 grafts from their rootstocks. The first of a series of intraspecific Douglas-fir crosses was planted on four areas on Vancouver Island. The number of 1+0 seedlings in the nursery increased to 20 000, most of them being from intraspecific crosses and inbred lines, the rest from various provenances and rootstocks of known parentage.

No cruising for plus trees was done; instead, work concentrated on propagating the registered trees in the experimental clone bank. Plus trees represent 445 of the 615 trees in the register. In addition to enlarging the research nursery and clone bank, the transplant area was doubled in size. Douglas-fir seed was collected from plus trees at higher elevations in order to establish seedling orchards.

Two tests of Douglas-fir planting stock showed 86% second-year survival because the valley-bottom sites had not yet brushed in. There were no differences in survival between large and small grades, between seedlings and transplants, or between mattock and shovel plantings. This emphasizes the importance of care in handling and planting. On the other hand, survival of Douglas-fir seedlings in plastic bullets fell from 16.6 to 9.3%.

Nursery fertility studies at the Koksilah nursery (south of Duncan) showed a positive response to phosphorus application, and additional experimentation suggested that the time of application was as important as the amount. Different sources of nitrogen did not affect Douglas-fir seedling size but did affect density.

In the Sayward Provincial Forest, 26 000 ha were studied in an investigation of soil properties and their relationship to the growth of Douglas-fir plantations. In the same area a small experimental cleaning program, started in 1959, continued, and sample plots were thinned for the first time.

In the Kamloops Forest District the second year of direct seeding mixed species in the Interior wet belt produced much better results than the first year's seeding, although this might have been due to more favourable climatic conditions. Significant differences were discovered between germination and survival with different seed treatments and seedbed preparation.

In the Prince George Forest District the main research effort went into a problem analysis of the spruce and pine forest types in relation

to changes in forest practices resulting from the establishment of four large pulp companies. The study on long-term effectiveness of scarified seedbeds neared completion and a spruce provenance study was established on the Aleza Lake Forest Reserve. Lodgepole pine seed was sown on top of the snowpack on a burned site in order to test germination rates.

In the Prince Rupert Forest District two blocks of white and Engelmann spruce were planted as part of a province-wide provenance study. Direct seeding studies of lodgepople pine began, along with placement of seed dissemination traps. Additional work was done to classify lodgepole pine site types in the Burns Lake–Smithers area.

The research headquarters were relocated from Prince Rupert to Smithers.

The Research Program co-operated with the Canada Land Inventory program's surveys of the Prince George Special Sales Area, the southern part of the Rocky Mountain Trench, and the Princeton–Tulameen mapsheet. Climate stations were established to supplement the existing network.

The system of official scale computing, calculation of charges, printing of accounts, and maintenance of statistics in the Vancouver Forest District office was redesigned for the IBM 1440 computer. Forty-five new computer programs were designed and written, 15 files organized, and staff retrained. The three most-used programs were for multiple regression analysis, analysis of variance, and simple descriptive statistics.

1967 The Cowichan Lake Research Station's Douglas-fir clone bank now contained 608 registered clones. Seedlings from provenances at the southern range of Douglas-fir were grown for outplanting in the station's arboretum. A second series of intraspecific Douglas-fir crosses was planted on eight test sites on Vancouver Island and the Lower Mainland. Overall survival of the 16 951 trees was 91.5%.

Seedlings produced from cones collected in 1966 were raised in the nursery to provide stock for the proposed seed orchards at Koksilah and Campbell River. Additional Douglas-fir seedlings were grown for field trials in three different coastal climatic zones.

Nursery fertility studies continued in coastal and interior conifer nurseries. Other studies on nursery stock dealt with micronutrients, seedling growth, and frost hardiness.

Soil classification methods to permit interpretations for tree growth were tested on 77 500 ha in the Sayward Provincial Forest portion of the Quadra Public Sustained Yield Unit. By combining information on geology, geomorphology, soils, and vegetation, a mapping scheme that groups mapping units at several levels was devised. Interpretations could be made for site productivity, harvesting methods, trafficability, erosion potential, prescribed burning, tree species suitability, regeneration probability, thinning, and fertilization.

Direct seeding studies continued in the Interior wet belt forests of the Kamloops Forest District. Plantations were established to study the effect of altitude on a specific provenance of spruce. Spacing trials for Engelmann spruce and western larch were initiated.

Tree improvement work on lodgepole pine and white spruce began

in the Prince George Forest District in 1967, based at the Red Rock Nursery and Research Centre. This facility was established south of Prince George in recognition of the need for increased reforestation in central British Columbia. Research also began on nursery practices, site preparation techniques, direct seeding, and planting.

A number of seeding and planting projects began in the Prince Rupert Forest District, along with a study of the relative suitability of different lodgepole pine planting stocks for various sites in the north. The silvicultural implications of prescribed burning were also examined.

The Research Division co-operated with Canada Land Inventory soil surveys in the Chilcotin, Okanagan, East Kootenays, and Northern Interior. Temporary climate stations were established to fill in the existing network.

The timber scale data sheets were re-organized and other improvements and efficiencies made. New computer programs were written to compare check scales, compare rescales, adjust stumpage prices, and supply additional statistical reports.

1968 An additional 2 ha were cleared at the Cowichan Lake Research Station for the Coastal Douglas-fir Tree Improvement Program. A third series of intraspecific crosses was established on five test sites on Vancouver Island. Of the 13 879 seedlings planted in the spring, 95% survived the first growing season.

Controlled pollinations were made on the clones of 16 plus trees and on 10 first-generation inbreds. Another 15 provenances of Douglas-fir from New Mexico, Arizona, California, Colorado, Montana, and British Columbia were established in the breeding arboretum. Douglas-fir seedlings from 88 provenances were planted on a 10-ha test site near Sooke.

A collection of seed, cones, and foliage was assembled from 150 lodgepole pine provenances to study this species' geographic variation. Seed from 30 were sown in the research nurseries at Cowichan Lake and Red Rock. The long-term production of genetically improved seed of interior spruces began with the collection of seed and cuttings from 183 trees with better than average form.

The soil classification methods developed and tested in 1967 were accepted favourably by the forest industry, and a few companies planned to undertake such mapping on their Vancouver Island holdings. Analysis of forest fertilization projects carried out by the Pacific Logging Company and Cominco was undertaken at their request.

Research at the western hemlock establishment trial in the Vancouver Forest District demonstrated the advantages of north aspects, shade, and a mineral soil substrate. The tree species and spacing study established in 1962 was well-established and most trees had assumed dominance over the competing vegetation. The western redcedar, however, suffered from heavy browsing.

An aerial seeding trial involving Douglas-fir and Engelmann spruce was completed in the Kamloops Forest District. The Douglas-fir seeding alone was successful, although the dispersal pattern was unfavourable, indicating the need for better ground control and a different flying pattern.

A 10-year study of partial cutting in the wet-belt forests of the

Nelson Forest District revealed that satisfactory regeneration and growth is obtainab[illegible] after a salvage cut. The other methods tried were a diameter limit cut and an improvement cut. The salvage cut removed the most volume.

The moderate to heavy white spruce seed crop in the Prince George Forest District resulted in a study of seed maturity in this species, with weekly cone sampling carried out in four stands during August and September. Another study was established to determine the feasibility of planting white spruce on fresh to moist sites during the summer, with the first of three annual plantings established. Early results suggested that bareroot planting through all or most of the growing season is feasible.

A spacing trial in two provenances of lodgepole pine was established north of Fort Fraser, in the Prince Rupert Forest District. Preliminary field investigations were made into the silvicultural impact of prescribed burning policies.

New computer programs were developed and others modified to permit data analysis, classification, summarization, and statistical analysis. Others were used to summarize meteorological data for the Canada Land Inventory and compute adjustments to stumpage rates required due to fluctuations in lumber prices.

1969 A fourth series of intraspecific crosses of Douglas-fir was established at two sites on Vancouver Island, with 4533 seedlings planted in the spring. Survival through the growing season was 98%. Measurements of current growth and total height were taken on the 12 test sites established in 1966 and 1967.

An additional 56 Douglas-fir provenances from the western United States, Mexico, and British Columbia were planted in the arboretum at the Cowichan Lake Research Station. Three more test sites for coastal Douglas-fir were established over a broad range of climate, bringing the total area planted for this project to 32 ha. Lodgepole pine was sown in research nurseries at Cowichan Lake as well as at Red Rock and assessed for morphology and growth behaviour.

The research nursery and greenhouse were completed at the Red Rock Nursery and Research Centre near Prince George. Preparation began on the clone bank area, the Interior Spruce Tree Improvement Program continued with the grafting of scions onto root stock, and seedlings were started for a progeny trial. Twenty-six lots of seed from 12 species of spruce were raised in flats for outplanting in 1971 at the research centre.

The study of Douglas-fir planting stock on high-site lands subject to dense vegetative cover in the Vancouver Forest District begun in 1962 was completed. Although vegetation competition was not an issue, the study revealed that large stock and transplant stock grew faster than small stock and 2+0 stock.

A 10-year study of western hemlock, western redcedar, and amabilis fir seedfall on the west coast of Vancouver Island revealed that seed crops, timing of seedfall, and germinative capacity were all irregular. Additional plantings of bareroot and mudpack seedlings were made at three locations on the mainland coast, at regular intervals during the

spring, summer, and fall. Preliminary results showed no advantages for mudpack seedlings, regardless of the time of planting.

Twenty-five plots at Cowichan Lake and Campbell River were thinned and 47 re-measured as part of a spacing and thinning study. These plots are yieldng information about the effects of early, delayed, single, or repeated thinnings and the effects of excessive densities on tree height and diameter.

A new study began near Mabel Lake, in the Kamloops Forest District, to examine techniques for rehabilitating overmature decadent western redcedar-western hemlock stands. About 240 ha of trees were downed and prepared for prescribed burning in 1970.

Between mid-May and early August, bareroot stock and mudpacked stock were outplanted in the Kamloops and Nelson forest districts. The intent of this study was to determine if mudpacking would extend the spring planting season by affording greater protection to the seedling root systems. However, results indicated that survival of Engelmann spruce and Douglas-fir bareroot stock was superior to that of the mudpacked stock. The failure of the latter to respond may have been partially due to storage and mudpacking methods. Mudpacked seedlings in the Nelson Forest District were preferred by rabbits.

Other projects in the Nelson Forest District concerned the rehabilitation of overmature stands of western redcedar and western hemlock, and means to extend the planting season in the Engelmann spruce forest type.

Planting of white spruce throughout the growing season near McLeod Lake, in the Prince George Forest District, continued. Survival of seedlings planted in 1968 was above 80% for all plantings, and a second replication was established in 1969. Initial assessments in the fall indicated a high level of survival, assuming that bareroot stock was handled with care, and that it may prove practical to plant 2+0 bareroot white spruce stock throughout most of the summer. Planting was to continue in 1970.

In the Prince Rupert Forest District a major study investigated the planting of lodgepole pine and white spruce as bareroot, container, and mudpack. Test sites were established near Chapman Lake for white spruce and near Burns Lake for lodgepole pine. Another project at Hazelton and Chapman Lake compared the performance of spring-lifted, cold-stored lodgepole pine seedlings at different times during the summer.

Seedling physiology studies defined mineral nutrition limits for Douglas-fir and Sitka spruce nursery stock, and controlled environment work confirmed that short photoperiods and cool nights hasten the development of frost hardiness in Douglas-fir seedlings, assuming that adequate moisture is present.

Soil studies included the response of trees to fertilizer application and mapping of the major soils of the San Juan Valley on Vancouver Island, both in conjunction with the forest industry.

Enhancements to the Research Division's computer programs permitted plotting of graphs, response surfaces, and perspective projections. Other routines enabled randomization in experimental design

and the division of sample plots into groups with similar species composition. The Vancouver office handled the stumpage adjustment programs, including those for the Kamloops and Prince Rupert forest districts.

1970 Checks were made of seedling survival on the 19 test sites comprising intraspecific crosses of Douglas-fir at different locations on the Coast. Heights were measured on five sites planted in 1968. Some of the crosses with pollen parents from Washington and Oregon looked very promising. Nine new sites were selected and staked for planting of 33 000 1+1 seedlings being grown in the nursery.

Ten sites to study coastal Douglas-fir provenances were planted in the spring and 10 more prepared for planting in the spring of 1971. A collection of spruce from 20 species and 57 seed sources from throughout the world was planted near Chilliwack.

In co-operation with the Reforestation Division, wind-pollinated seed was collected from the Coast–Interior transition zone near Pemberton and the Fraser Canyon. The intent was to collect cones from at least 150 trees in 1970 and 1971 and establish a high-elevation seed orchard using wind-pollinated material from the correct geographical and elevational ranges.

Construction of a small laboratory began at the Red Rock Nursery and Research Centre in which seed extraction, cleaning, counting, and germination tests would be carried out. Another area was cleared for a clone bank, and large numbers of spruce and lodgepole pine seedlings were being raised in the nursery for various investigations.

In order to establish criteria for provenance transfer and tree breeding, the range-wide assessment of genetic variation in lodgepole pine continued. Detailed observations and measurements were made on cones and needles as well as on seedlings grown at the Red Rock and Cowichan Lake research nurseries.

Over 3000 rootstocks were potted to receive scions from 75 lodgepole pine plus trees from northern British Columbia and the Yukon. The plus trees were located by forestry crews from the University of British Columbia, working on behalf of Svenska Cellulosa Company of Sweden. The trees will be propagated in a clone bank at the Red Rock site.

After provincial land in Saanich, near Victoria, was obtained, an office, greenhouse, and headerhouse were constructed, and a plant physiology nursery was established. This facility, now called the Research Branch Laboratory, also contains controlled-environment chambers and laboratory facilities.

The Forest Land Classification System was adopted as the formal mapping scheme for forested land. It will enable intensive forest management on tree farm licences and public sustained yield units. A few experimental mapping projects were undertaken with the forest industry on some tree farm licences.

Analysis of vegetation data indicated "noda," or groups of plant species indicative of site conditions and forest productivity. Data

processing assistance was provided to the scaling office in the Vancouver Forest District as well as the Inventory, Management, and Reforestation divisions in Victoria.

The Forest Productivity Program was begun in order to provide guidelines and leadership in growth and yield research related to intensive forest management. The Forest Productivity Committee will direct research projects on spacing, thinning, and fertilization that will determine future policy regarding harvest levels.

Research on integrated resource management problems began, including an interdisciplinary study of the effects of forest harvesting on coastal fish habitat at Carnation Creek, on the west coast of Vancouver Island.